

# **New York State Testing Program 2016: English Language Arts and Mathematics Grades 3–8**



## **Technical Report**

**Questar Assessment, Inc.  
2016**

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## **Section 1: Introduction and Overview**

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### **1.1. Introduction**

This technical report provides detailed information regarding the technical, statistical, and measurement attributes of the New York State Testing Program (NYSTP) for the Grades 3–8 Common Core English Language Arts (ELA) and Mathematics 2016 Operational Tests. This report includes information about test content and test development, item (i.e., individual test question) and test statistics, validity and reliability, differential item functioning (DIF) studies, test administration, scoring, linking, scaling, and student performance.

### **1.2. Test Purpose**

The 2016 Grades 3–8 Common Core ELA and Mathematics NYSTP has been designed to measure student knowledge and skills as defined by grade-level New York State Common Core Learning Standards (CCLS) in ELA and Mathematics. The tests are designed to allow the classification of student proficiency into four performance levels (Level I, Level II, Level III, and Level IV). Likewise, the test provides students at each of these performance levels opportunities to demonstrate their knowledge and skills in the CCLS. Details about the content standards for ELA and Mathematics are described in Section 2.4: Test Blueprints.

### **1.3. Expected Participants**

Students in New York State public school grades 3, 4, 5, 6, 7, and 8 (and ungraded students of equivalent chronological ages) are the expected participants in the Grades 3–8 NYSTP. Non-public schools may participate in the testing program, but their participation is not mandatory. In 2016, some non-public schools participated in the testing program across all grade levels. These schools were included in the data analyses. Public school students were required to take all State assessments administered at their grade level, except for a very small percentage of students with severe cognitive disabilities who took the New York State Alternate Assessment (NYSAA). For more detail on this exemption, please refer to the *NYSTP Grades 3–8 Common Core English Language Arts and Mathematics Tests School Administrator’s Manual* (SAM), available online at <http://www.p12.nysed.gov/assessment/sam/ei/eisam16.pdf>.

### **1.4. Test Use and Decisions Based on Assessment**

The NYSTP Grades 3–8 Common Core ELA and Mathematics Tests are used to measure the extent to which individual students achieve the New York State CCLS in ELA and Mathematics, respectively, in order to determine whether or not schools, districts, and the State meet the required progress objectives specified in the New York State accountability system. Several types of scores are available from the Grades 3–8 ELA and Mathematics Tests, and they are discussed in this section.

#### **1.4.1. Scale Scores**

The scale scores are a quantification of the proficiency measured by the Grades 3–8 Common Core ELA and Mathematics Tests at each grade level. Scale scores are comparable only within a given subject and grade. Scale scores are not comparable across grades or across subjects. The scale scores are reported at the individual student level, and can be aggregated. Detailed information on the derivation and properties of the scale scores is provided in Section 6: IRT Calibration and Linking. The Grades 3–8 ELA and Mathematics Tests’ scale scores are the basis

for placing students into performance levels, which are used to determine student progress within schools and districts; support registration of schools and districts; determine eligibility of students for additional educational services; and provide teachers with indicators of a student's need, or lack of need, for remediation in specific content-area knowledge.

#### *1.4.2. Statewide Percentile Ranks*

Students' scale scores were also presented as percentile ranks in order to indicate student performance relative to the entire testing population on a scale that may be more familiar than the operational test's scale. Such statistics were estimated based on the how often each student earned a given scale score, thus presenting similar information as the scale score itself but on an alternate scale.

#### *1.4.3. Performance Level Cut Scores and Classification*

Student performance is classified as Level I, Level II, Level III, or Level IV for the Grades 3–8 Common Core ELA and Mathematics Tests. The definitions of performance levels are as follows:

- **NYS Level I:** Students performing at this level are well below proficient in standards for their grade. They demonstrate limited knowledge, skills, and practices embodied by the New York State P–12 Common Core Learning Standards for English Language Arts/Literacy or Mathematics that are considered insufficient for the expectations at this grade.
- **NYS Level II:** Students performing at this level are below proficient in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the New York State P–12 Common Core Learning Standards for English Language Arts/Literacy or Mathematics that are considered partial but insufficient for the expectations at this grade.
- **NYS Level III:** Students performing at this level are proficient in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the New York State P–12 Common Core Learning Standards for English Language Arts/Literacy or Mathematics that are considered sufficient for the expectations at this grade.
- **NYS Level IV:** Students performing at this level excel in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the New York State P–12 Common Core Learning Standards for English Language Arts/Literacy or Mathematics that are considered more than sufficient for the expectations at this grade.

The performance level cut scores used to distinguish between Levels I, II, III, and IV were established during the process of standard setting in Summer 2013. The process is described in detail in Section 8 and Appendix P in the 2013 technical report (NYSED, 2013).

#### *1.4.4. Subscores*

The Grades 3–8 Common Core ELA tests have two subscores: reading (which includes all multiple-choice items assessing both reading and language standards) and writing to sources

(which includes all constructed-response items assessing reading, writing, and language standards). The Grades 3–8 Common Core Mathematics tests have three subscores that are the domain-level scores for items measuring the *Major Clusters* in each grade. The CCLS are divided into *Major*, *Supporting*, and *Additional Clusters*. Standards within *Major Clusters* are the intended focus of instruction and assessment and account for the majority of the Mathematics test items. The *Supporting* and *Additional Clusters* are Mathematics standards that both introduce and reinforce *Major Clusters*. Tables 1.1 and 1.2 present the reporting subscore categories and the point values that correspond to each on the 2016 tests. In 2016, subscores were reported in two ways:

1. A raw score (i.e., number of points earned) out of the total score on the test
2. The average score at the state level for each subscore category

**Table 1.1. ELA Subscore Categories and Total Possible Score Points**

| Grade | Total Subscore Points |                    |
|-------|-----------------------|--------------------|
|       | Reading               | Writing to Sources |
| 3     | 25                    | 22                 |
| 4     | 25                    | 22                 |
| 5     | 35                    | 22                 |
| 6     | 35                    | 22                 |
| 7     | 35                    | 22                 |
| 8     | 35                    | 22                 |

**Table 1.2. Mathematics Subscore Categories and Total Possible Score Points**

| Grade | Reporting Subscores and Total Subscore Points |   |                                       |
|-------|---|---|---------------------------------------|
|       | Subscore 1                                    | Subscore 2                              | Subscore 3                            |
| 3     | Operations and Algebraic Thinking<br>25       | Number and Operations—Fractions<br>11   | Measurement and Data<br>11            |
| 4     | Operations and Algebraic Thinking<br>11       | Numbers and Operations in Base 10<br>16 | Number and Operations—Fractions<br>17 |
| 5     | Numbers and Operations in Base 10<br>16       | Number and Operations—Fractions<br>23   | Measurement and Data<br>7             |
| 6     | Ratios and Proportional Relationships<br>17   | The Number System<br>13                 | Expressions and Equations<br>23       |
| 7     | Ratios and Proportional Relationships<br>20   | The Number System<br>12                 | Expressions and Equations<br>21       |
| 8     | Expressions and Equations<br>28               | Functions<br>11                         | Geometry<br>12                        |

### **1.5. Testing Accommodations**

In accordance with federal law under the Americans with Disabilities Act and the section Fairness in Testing and Test Use in the *Standards for Educational and Psychological Testing* (AERA, APA, and NCME, 2014), accommodations that do not alter the measurement of any construct being tested are allowed for test takers. The allowance is in accordance with a student's Individualized Education Program (IEP) or Section 504 Accommodation Plan (504 Plan). School principals are responsible for ensuring that proper accommodations are provided when necessary, and that staff providing accommodations are properly trained. Details on testing accommodations can be found in the [2016 School Administrator's Manual \(SAM\)](#).

### **1.6. Test Transcriptions**

For visually impaired students, large-type and Braille editions of the test books are provided. In most cases, the students dictate and/or record their responses, the teachers transcribe student responses to the multiple-choice items onto scannable answer sheets, and the teachers transcribe the responses to the constructed-response items onto the regular test books. Some of the students who use large-type editions will fill in the answer sheets by themselves. The large-type editions are created by Questar Assessment, Inc. and printed by Midland Information Resources, and the Braille editions are produced by gh, LLC. gh employs certified Library of Congress Braille transcribers and delivers Braille in accordance with the Braille Authority of North America (BANA) standards. Camera-ready versions of the regular test books are provided to the Braille vendor, which then produces the Braille editions. Proofs of the Braille editions are submitted to NYSED for review and approval prior to production.

### **1.7. Test Translations**

The NYSTP Grades 3–8 Common Core Mathematics Tests are translated into five languages: Chinese (Traditional), Haitian-Creole, Korean, Russian, and Spanish. These tests are translated to provide students the opportunity to demonstrate mathematical proficiency independent of their command of the English language. Sample tests are available in each translated language at the following location: <http://www.p12.nysed.gov/assessment/math/samplers/>.

English language learners (ELLs) taking the Grades 3–8 Common Core Mathematics Tests may be provided with an oral translation of the test when a written translation is not available in the student's native language. The following testing accommodations are also made available to ELLs: separate testing location, bilingual glossaries, simultaneous use of English and alternative-language editions, oral translation for lower-incidence languages, and writing responses in the native language.

The NYSTP Grades 3–8 Common Core ELA Tests are not translated into any other language because they are assessments of proficiency in English language arts. The following testing accommodations are made available to ELLs taking the ELA Tests: separate testing location and bilingual glossaries.

## Section 2: Test Design and Development

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### 2.1. Test Descriptions

The 2016 Grades 3–8 Common Core ELA and Mathematics Tests are criterion-referenced tests composed of multiple-choice (MC) and constructed-response (CR) test items based on the New York State P–12 CCLS. The tests were administered in New York State classrooms during a three-day period in April 2016. Details on the administration and scoring of these tests can be found in Section 4: Test Administration and Scoring. Additional information can be found in the *NYSTP Grades 3–8 Common Core English Language Arts and Mathematics Tests School Administrator’s Manual* (SAM), available at: <http://www.p12.nysed.gov/assessment/sam/ei/eisam16.pdf>.

#### 2.1.1. ELA Tests

The 2016 Grade 3–8 Common Core ELA Tests were designed to measure student literacy as defined by the CCLS. The tests assessed Reading, Writing, and Language standards by using multiple-choice, short-response, and extended-response items. All items were based on close readings of informational, literary, or paired texts. All texts were drawn from authentic, grade-level works.

Multiple-choice items were designed to assess Common Core Reading and Language Standards. Multiple-choice items required students to analyze different aspects of a given text, including central idea, style elements, character and plot development, and vocabulary.

Short-response items were designed to assess Common Core Reading and Language Standards. These were single items in which students used textual evidence to support their answers to inferential questions. These items asked students to make an inference, state a position, or draw a conclusion based on their analysis of the passage and then provide two pieces of text-based evidence to support their answers. In responding to these items, students were expected to write in complete sentences. Appendix H provides the rubric for the short-response items.

Extended-response items were designed to assess Reading, Writing, and Language Standards, with a focus primarily on the Writing Standard. Extended-response items required comprehension and analysis of either an individual text or paired texts. Paired texts required students to read and analyze two related texts. Paired texts were related by theme, genre, tone, time period, or other characteristics. Many extended-response items asked students to express a position and support it with text-based evidence. For paired texts, students were expected to synthesize ideas between and draw evidence from both texts. Extended-response items required students to demonstrate their ability to write a coherent essay, using textual evidence to support their ideas. Appendix L provides the rubric for the extended-response items.

#### 2.1.2. Mathematics Tests

The 2016 Grade 3–8 Common Core Mathematics Tests were designed to measure student mathematic understanding as defined by the CCLS. The tests required that students understand Mathematics conceptually, use prerequisite skills with grade-level mathematical facts, decide which formulas and tools (e.g., protractors and rulers) to use, and solve mathematics problems rooted in the real world. The tests contained multiple-choice, short-response (2-point), and extended-response (3-point) items. For multiple-choice items, students selected the correct



response from four answer choices. For short- and extended-response items, students wrote an answer to an open-ended question. Some items required students to show their work or to explain, in words, how they arrived at their answers.

Mathematics multiple-choice items were used mainly to assess standard algorithms and conceptual standards. Multiple-choice items incorporated the New York State CCLS, some in real-world applications. Many multiple-choice items required students to complete multiple steps. Likewise, many of these items were linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts.

Short-response items were used mainly to assess conceptual and application standards. The items required students to complete a task and show their work. Like multiple-choice items, short-response items often required multiple steps, the application of multiple mathematics skills, and real-world applications. Appendix J provides the rubric for the Mathematics short-response items.

Extended-response items were used mainly to assess students' abilities to show their understanding of mathematical procedures, conceptual understanding, and application of those procedures and concepts. Extended-response items required students to complete two or more tasks or a more extensive problem and show their work. Some items also assessed student reasoning and the ability to critique the arguments of others. Appendix K provides the rubric for the Mathematics extended-response items.

## **2.2. Test Configuration**

### **2.2.1. Test Book Design**

The 2016 Grades 3–8 Common Core ELA Tests were composed of three books per grade and administered in three sessions over three days. Each day consisted of one book; Book 1 and Book 2 contained literary and informational reading passages and MC items based on the passages. Book 2 also contained reading passages with short-response items and an extended-response item based on those passages. Book 3 contained only reading passages with short-response items and an extended-response item based on those passages.

The 2016 Grades 3–8 Common Core Mathematics Tests were composed of three books per grade and administered in three sessions over three days. Each day consisted of one book: Book 1 and Book 2 contained MC items. Book 3 contained short- and extended-response items. The tables in Appendix A provide information on the numbers and types of items in each book for the Grades 3–8 Common Core ELA and Mathematics Tests and the testing times.

### **2.2.2. Embedded Field-Test Items**

In 2010, NYSED announced its commitment to embed multiple-choice items for field testing within the Spring 2012 Grades 3–8 ELA and Mathematics Operational Tests. This commitment continued for the Spring 2016 administrations of the Common Core tests. Embedding field-test items allows for a better representation of student responses and provides more reliable field-test data on which to build future operational tests. In other words, since the specific locations of the embedded field-test items were not disclosed and they look the same as operational test items, students were unable to differentiate field-test items from operational test items. Therefore, field-

test data derived from embedded items are free of the effects of differential student motivation that may characterize stand-alone field-test designs. Embedding field-test items also reduced the number of stand-alone field-test forms during Spring 2016, although it did not eliminate the need for them.

### **2.3. New York State Educators' Involvement in Test Development**

New York State educators are actively involved in Common Core ELA and Mathematics test development. New York State educators provide critical input throughout all stages of the test development process, which include standard setting, rangefinding, educator item review, operational forms construction, and “Final Eyes” meeting (a final review of the test books prior to printing).

NYSED gathers a diverse group of educators to review all test materials, in order to create fair and valid tests. The participants are selected for each testing activity, based on:

- Certification and appropriate grade-level experience
- Special population experience
- Geographical region
- Gender
- Ethnicity
- Type of school (urban, suburban, or rural)

The selected participants must be certified and have both teaching and testing experience. Most of the participants are classroom teachers. Specialists such as reading coaches, literacy coaches, and special education and bilingual instructors also participate. Some participants are also recommended by principals, professional organizations, Big Five Cities (i.e., Buffalo, New York City, Rochester, Syracuse, and Yonkers), and/or the Staff and Curriculum Development Network (SCDN). A file of participants is maintained and routinely updated with current participant information, as well as the addition of possible future participants as recruitment forms are received. The process of continuously updating and adding to this file contributes to NYSED's ability to include many educators in the test development process. Every effort is made to have diverse groups of educators participate in each testing event.

Additionally, Content Advisory Panels (CAPs) meet quarterly to review, vet, and provide comments on curricular and assessment work. CAPs are content-area-specific advisory panels composed of between 15 and 20 New York State P-20 educators whose members are nominated by state professional organizations, institutes of higher education, and educator unions.

### **2.4. Test Blueprints**

After careful consideration of test length and administration constraints (e.g., location of multiple-choice and constructed-response items within test books), the representation and distribution of content were determined.

The CCLS for ELA are organized into four strands: Reading, Writing, Language, and Speaking/Listening. Due to administration constraints, Speaking/Listening was determined to best be assessed in the classroom, only; therefore, the Common Core ELA Tests assess three of

the four strands: Reading, Writing, and Language. Content experts reviewed the Reading, Writing, and Language standards and recommended content coverage by standard and item type, based on the depth and breadth of each standard.

The CCLS for Mathematics are divided into standards, clusters, and domains. Standards define what students should understand and be able to do and are further articulated into lettered components. Clusters are groups of related standards. Domains are larger groups of related clusters and standards. Content experts reviewed the Mathematics standards and recommended content coverage by standard and item type (i.e., MC or CR), based on the emphasis of the cluster (major, supporting, and additional) and depth and breadth of each standard.

Tables B1 and B2 in Appendix B show the test blueprint and actual number of score points in the Grades 3–8 Common Core ELA and Mathematics Tests, respectively. The tables include the ranges of allowable points for each ELA strand and Mathematics domain and the actual number of points on the 2016 operational tests.

## **2.5. Passage Selection and Item Criteria Documents**

The 2016 administration was the first year in which Questar delivered the New York State tests<sup>1</sup>. To guide test item development and to help ensure that New York State tests were measuring the CCLS for ELA and Mathematics with fidelity, criteria were established for selecting passages and writing test items, based on the consultation with the groups listed above.

The *Passage Selection Guidelines for Assessing Common Core State Standards (CCSS) ELA* were created to provide a framework that allows for the consistent selection of passages that are appropriately complex for the given grade and contain the specific characteristics necessary to measure different standards (see Appendix C). The guidelines describe the quantitative methods used to determine the grade appropriateness of a given text. They also describe the grade-specific text characteristics needed to develop items that measure any particular reading standard. The complete guidelines can be found here:

[http://www.engageny.org/sites/default/files/resource/attachments/passage\\_selection\\_guidelines\\_for\\_assessing\\_ccss\\_ela.pdf](http://www.engageny.org/sites/default/files/resource/attachments/passage_selection_guidelines_for_assessing_ccss_ela.pdf).

*Passage Review Criteria* documents were created based on the passage selection guidelines and were used to evaluate each potential passage and determine whether or not it could be used to measure the CCSS for ELA. The criteria documents were used to determine whether each passage suggested for testing use was grade appropriate, fair, and possessed the necessary characteristics to assess each standard. Specifically, passages were evaluated for the presence and quality of key ideas and details, craft and structure, and integration of knowledge and ideas. The full passage review criteria can be found here:

[http://www.engageny.org/sites/default/files/resource/attachments/new\\_york\\_state\\_passage\\_review\\_criteria\\_protocol\\_document.doc](http://www.engageny.org/sites/default/files/resource/attachments/new_york_state_passage_review_criteria_protocol_document.doc).

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<sup>1</sup> The items and passages selected for the operational test and field tested as embedded items were developed by the previous test delivery vendor. In general, the previous vendor completed the portion of the work prior to the construction of operational forms, while Questar worked with NYSED and educators to build the forms and performed all subsequent operational work.

*Item Review Criteria for the Grade 3–8 ELA Tests* were used to help ensure that each item was clear and fair, measured a specific Common Core standard or standards with fidelity, and conformed to the specifications for each item type. Each section of the criteria includes pertinent questions used to determine whether or not an item was of sufficient quality so that it could move forward in the development process. The first two of the *Item Review Criteria*, clarity and fairness, identify the basic components of quality items. The criteria for clarity are used to help ensure that students understand what is asked in each item and that the language choice in the item does not negatively affect a student’s ability to perform the required task. For example, the criteria include checking to make sure that the vocabulary of test items is at grade level and that items avoid technical terms unrelated to the content. Likewise, the fairness criteria are used to ensure that items are unbiased, non-offensive, and not disadvantageous to any given subgroup. The criteria also address how each item measures a given standard or standards and articulates the aspects of each standard that the items need to address. Finally, the criteria establish key requirements for each item type (e.g., requiring that each two-point constructed-response item asks students to make a clear statement that can be supported with two independent text-based pieces of evidence). The complete ELA criteria documents can be found here: <http://www.engageny.org/resource/new-york-state-item-review-criteria-for-grade-3-8-english-language-arts-tests>.

*Item Review Criteria for the Grade 3–8 Mathematics Tests* were used to ensure clarity, language and graphical appropriateness, fairness, freedom from bias, fidelity of measurement to the CCSS, and conformity to the expectations for specific item types and formats for each test item. Each section of the criteria includes pertinent questions that determine whether an item is of sufficient quality. The first two criteria, clarity and graphical appropriateness and fairness, identify the basic components of quality test items. The criteria for clarity and graphical appropriateness are used to help ensure that students understand what is asked in each item and that the language in the item does not adversely affect a student’s ability to perform the required task. For example, the criteria include checking to make sure that the visual load for any item containing art is reasonable and that interpreting a graphic does not confuse the underlying construct. Likewise, the fairness criteria are used to evaluate whether or not items are unbiased, non-offensive, and not disadvantageous to any given subgroup. The criteria also require documentation of how each item measures the assigned Mathematics standard(s). Finally, the criteria address the specific demands for different item types and formats (making sure that each three-point constructed-response item involves a multi-step process and requires students to show work). The complete Mathematics criteria document can be found here: <https://www.engageny.org/resource/new-york-state-item-review-criteria-for-grade-3-8-mathematics-tests>.

The *Multiple Representations for NYS Grade 3–8 Common Core Mathematics Tests* document was developed to ensure that the tests measured the deep conceptual understanding that CCSS demand, rather than focusing on predictable Mathematics items that require only algorithmic strategies to be solved correctly. *Multiple Representations* are a broad set of specifications that describe, refer to, and symbolize the various, but not all, ways that Mathematics standards could be measured within the constraints of the NYSTP. The document specifies three overarching families: procedural skills, conceptual understanding, and application. It also includes information about how to identify standards that might be measured through the use of a particular representation. It identifies types of Mathematics skills (e.g. application of process and explanation of a principle) that are appropriate for assessing different representations. The full

document can be found here: <https://www.engageny.org/resource/multiple-representations-for-nys-grade-3-8-common-core-mathematics-tests>.

### *2.5.1. Principles of Universal Design*

To create tests as equitable as possible for students, principles of Universal Design were employed during the creation of the tests and test items. In a report published by the National Council on Educational Outcomes, “Universally designed assessments” are designed and developed from the beginning to allow participation of the widest possible range of students, and to result in valid inferences about performance for all students who participate in the assessment” (Thompson, S.J., Johnstone, C.J., & Thurlow, M.L. 2002). The report goes on to describe seven elements of a universally designed assessment. These elements are:

1. Inclusive assessment population
2. Precisely defined constructs
3. Accessible, unbiased items
4. Amenable to accommodations
5. Simple, clear, and intuitive instructions and procedures
6. Maximum readability and comprehensibility
7. Maximum legibility

In accordance with these elements, the Universal Design Item Checklist in Appendix D was developed for use during item development.

## **2.6. Passage Finding**

The goal of passage finding is to obtain high-quality texts from which to generate CCSS-aligned test items. To do so, in the 2013–2014 development cycle, independent passage finders were recruited and trained, using passage selection resources such as the passage selection criteria. Passage finders were given assignments based on the test blueprint requirements. Passage finders submitted passages along with completed criteria documents and source information to ELA content specialists, who reviewed the passages against the agreed-upon criteria. Passages that did not meet the criteria were rejected, and passages that did meet the criteria were moved forward in the process, where the text from scanned copies of the original sources was entered into templates. Once in the templates, readability metrics were determined for each text, and it was then proofread by copyeditors, fact checked by research librarians, reviewed for content issues by Science and Social Studies content specialists, and reviewed for Universal Design issues by specifically trained reviewers. After the passages went through these review steps, ELA content specialists posted the passages and completed criteria documents for NYSED’s review and approval for moving forward in the process.

NYSED staff retrieved and reviewed the passages and criteria documents. If NYSED staff determined that a passage did not meet the criteria, the passage was rejected and the NYSED staff provided an explanation for the reason for rejection.

In addition to the content reviews performed by NYSED staff and its vendors, the passages were also reviewed by executives in both organizations. The executive review focused on bias and sensitivity issues particular to New York State. Passages that passed both content and executive reviews were moved forward for item development.

## **2.7. Item Development**

Item development for the 2016 test forms was conducted during the 2013–2014 development cycle. The goal of item development is to develop a sufficient number of high-quality, CCSS-aligned items to populate the test forms. Using the criteria documents for both content areas and the multiple-perspective document for Mathematics, content leads trained item writers. The item writers had teaching or assessment experience in the content area for which they were writing items; experience in writing for large-scale, high-stakes assessments; and, at minimum, a bachelor's degree in either education and/or the content area for which they were assigned. The item writers were given specific assignments, based on the test blueprint. For ELA, the item writers were also provided with the completed passage criteria documents.

Item writers provided items and completed criteria documents to content specialists for review. Two content specialists reviewed each item and its corresponding criteria document. Items that did not meet the criteria were sent back to the writers with specific feedback for revision. Items that did not meet the criteria after an attempted revision were rejected and replaced by content specialists. After the content specialists were satisfied that all of the items met the criteria, the items were reviewed by copyeditors. The Mathematics items were also reviewed by content specialists in Science and Social Studies and by research librarians. The ELA and Mathematics content specialists evaluated the feedback from the different internal groups and edited the items accordingly. The items and criteria documents were then posted for NYSED's review and approval for moving forward in the process.

NYSED content experts retrieved and reviewed the items and criteria documents. If NYSED staff determined that an item did not meet the criteria, the item was rejected and the NYSED staff provided an explanation for the reason for rejection, then replaced the item and completed criteria documents, which were resubmitted to NYSED. If NYSED staff determined that an item met the criteria but could be improved with editing, the staff member recorded notes for the edits. Those notes were reviewed at face-to-face meetings at which content staff and NYSED staff reviewed and edited all of the items to ensure that they met the criteria. All passages and items accepted at that meeting were moved forward for the educator item review.

## **2.8. Educator Item Review**

After being reviewed by NYSED, the items were presented to panels of New York State educators. Based on their expertise, educators were assigned to grade-level and content-specific groups where they reviewed the items. The reviews were facilitated by Questar content specialists and were attended by NYSED staff. For ELA, reviewers first read and then discussed the passages before reviewing items. For Mathematics and ELA, the educators used the following checklist to review each item.

1. Does the item align to the designated standard(s)?
  - The item measures the content standard(s) that it was designed to measure.
2. Does the item meet quality standards?
  - The item is worded clearly.
  - The reading level of the item is grade appropriate.
  - The item has one correct answer.

- The item has plausible, unambiguous distractors.
- All of the distractors are mutually exclusive.

3. Is the item fair?

- The item is free from bias on the basis of students' personal characteristics, such as gender or ethnicity.

As the educators reviewed the items, they discussed their judgments about them. If the educators felt that an item did not align to the standards, meet quality standards, or was not fair, they made recommendations for editing the item. NYSED staff and Questar content specialists later reviewed the recommendations and made the appropriate edits.

## 2.9. Field-Testing

Once the items have been developed and thoroughly reviewed by a variety of stakeholders, they must then be field-tested. Field-testing items is a critically important step in the test development process, as it is only through the gathering of actual student response data that a variety of psychometric characteristics may be evaluated. Table 2.1 provides a summary of the unique items that passed the scrutiny of NYSED and Questar content specialists, as well as that of New York State educators, and were field-tested. More items were field tested than were needed on the operational forms because that enabled tests to be constructed with items that include the best possible characteristics from both a content and psychometric perspective.

**Table 2.1. Summary of Unique 2015 Field Test Items**

| Grade | Unique ELA<br>Items by Type* |    | Unique Mathematics<br>Items by Type* |    |
|-------|------------------------------|----|--------------------------------------|----|
|       | MC                           | CR | MC                                   | CR |
| 3     | 126                          | 48 | 96                                   | 22 |
| 4     | 125                          | 48 | 120                                  | 25 |
| 5     | 138                          | 48 | 120                                  | 25 |
| 6     | 137                          | 48 | 125                                  | 25 |
| 7     | 138                          | 48 | 123                                  | 25 |
| 8     | 138                          | 48 | 121                                  | 25 |

\* MC = multiple-choice. CR = constructed-response. All CR items were field-tested under stand-alone conditions, while MC items were administered under both embedded and stand-alone conditions.

Field test items were administered in Spring 2015 as embedded field test items within the 2015 operational test forms. The use of embedded field test items yields more reliable field-test data and reduces, but does not eliminate, the need for multiple-choice stand-alone field testing. One additional round of field testing was administered separately from the 2015 operational forms (i.e., as stand-alone tests) later in Spring 2015.

In order to better understand how the 2015 field test items may perform on future operational forms, a variety of analyses were conducted. All of the field test data underwent a series of representativeness checks. Because only a small sample of schools participate for any given content area and grade for stand-alone field testing, it was necessary to ensure that the stand-

alone field test samples were representative of the entire State population in terms of student achievement on prior years' tests, student gender, student ethnicity, and school Needs/Resource Capacity Category (NRC). Finally, a variety of psychometric analyses were conducted, including classical item analysis, inter-rater reliability for constructed-response items, differential item functioning (DIF), item response theory (IRT) item calibration, linking, scaling, and fit evaluation. Many of these analyses are described at length below. However, inter-rater reliability analyses were not possible for the operational test, as only a single rater scored each constructed-response.

## **2.10. Rangefinding**

Rangefinding for most items included on the 2016 test was conducted by Questar. Rangefinding occurs after constructed-response items have been field-tested. The purpose of rangefinding is to have New York State educators review student constructed responses and arrive at consensus scores based on the standards established by NYSED and the scoring rubrics. The consensus scores become the basis for operational rating guides and scoring ancillaries. To arrive at consensus, committees of New York State educators review, discuss, and rate student responses to the constructed-response field-test items. This process was overseen by NYSED content experts and Questar Scoring Directors. The first step in the rangefinding process was to have the educator committees review rubrics and a NYSED-approved grounding guide set, previously used for the 2015 field-test rangefinding sessions, to familiarize teachers with the application of NYSED standards and rubrics. The grounding guide sets contain student responses that illustrate the full range of scores on the rubric. The grounding guide sets are composed of student responses that had previously gone through the rangefinding process and been approved by NYSED, and are used to guide the scoring of field-test and operational student responses. Referencing the previously approved guide set papers during the rangefinding sessions ensures consistency in the application of NYSED standards and rubrics from year-to-year.

After the committee reviewed the preapproved grounding guide set, groups of committee members familiarized themselves with each item type, scoring a small number of responses representative of each of the different score points. After the group-scoring exercise, committee members independently scored other student responses. The committee then reviewed and discussed their results and determined consensus scores for the responses. The rangefinding results were used to build training materials for Questar scorers, who scored the field-test responses to constructed-response items.

## **2.11. Item Selection and Test Creation (Criteria and Process)**

The NYSTP Grades 3–8 Common Core ELA and Mathematics Tests were administered in April 2016. The test items were selected from the pools of available ELA and Mathematics items. These items were field-tested either in embedded field-testing or stand-alone field-testing from 2013 through 2015.

The test construction process involved several iterative steps. Three criteria governed the item selection process:

- Meet the ELA and Mathematics content specifications provided by NYSED



- Select items with the best psychometric characteristics from the ELA and Mathematics item pools
- Combine psychometric characteristics of all selected items with the intended psychometric goals for each entire form

Questar content specialists were provided with the test designs, blueprints, and psychometric guidelines for item selection. The psychometric guidelines were based on the classical and IRT statistics associated with the test items.

Using the pool of field-tested items, Questar content specialists made preliminary selections for each grade and content area. The selections were then reviewed by the content leads for each content area to make sure that the items conformed to the different criteria. If the content criteria were not met, new items were selected. After the content leads' review, the item selections were reviewed by Questar psychometricians. If items with undesirable statistics were selected, the psychometricians proposed items with more desirable statistics. Those items were then reviewed by the content specialists and their leads. Once the Questar content teams and the psychometric teams were satisfied that the content and statistics of the selected items and the proposed whole forms met the requirements, the items were given to NYSED staff (including content and assessment experts) to review. Questar content specialists and psychometricians traveled to Albany, New York, in October 2015 to finalize item selection and test creation with NYSED staff (including content and assessment experts) and educators.

## **2.12. Educator Form Construction**

During an educator form construction meeting that took place from October 26 – November 2, 2015, in Albany, New York, educators from around the State worked with NYSED and Questar to review the content of the proposed 2016 operational ELA passages, and ELA and Mathematics individual test items, and how those items combine to entire operational forms, for quality and appropriateness using their subject matter expertise. The goal was to ensure that all test items and forms are defensible from content and psychometric perspectives. The outcome was test forms that meet psychometric parameters and contain items that meet content criteria.

A different group of educators participated in the review of each subject and grade's test form, so each morning began with training in each room. Once training was complete, participants began the form construction process by independently evaluating the items and passages (for ELA) against the criteria on the provided checklists. Each participant completed his or her own checklist and had a binder with item cards corresponding to the order of items in the test.

- For ELA, the educators initially reviewed the first passage and a single item from the passage. Once they got used to the process, the educators reviewed the passages and the corresponding items. During this review, educators confirmed that there was only one correct answer for each multiple-choice item, and that the item was aligned to the standard that it purported to address. They also estimated the time that it would take for students to read the passage and answer the items.
- For Mathematics, the educators initially reviewed single items and discussed each item as a group. Once they got used to the process, the educators reviewed groups of items (e.g., 4 to 6 items, followed by discussion of each item). During this review, educators

confirmed that there was only one correct answer for each multiple-choice item, and that the item was aligned to the standard that it purported to address. They also estimated the time that it would take for students to answer the items.

In both ELA and Mathematics, the educators in consultation with NYSED and Questar content experts were permitted to recommend:

- revisions to the stated standard alignment;
- revisions to item sequencing to avoid cueing / clueing; and
- swapping any items that they judged as having problems flagged by the above reviews.

Given other constraints, it was not always possible to make every change that educators recommended, but they were given the opportunity to voice any and all concerns they had and NYSED made the final decision about any educator recommendations.

The facilitators then led a group discussion and helped the group reach consensus. Where time permitted, educators were presented with and approved the items that Questar and NYSED proposed for any necessary replacements. Following each session with educators, NYSED and Questar met to review the content and data of the proposed selections, and explore alternate selections for consideration. NYSED then approved the item selections, including item positions within test books.

### **2.13. Test Form Production**

Once the selection of items for the operational and embedded field-test positions was completed, Questar created test forms. The test forms were reviewed by Questar content specialists and were posted for NYSED to review. NYSED and Questar reviewed the forms to look for any errors in spelling, capitalization, punctuation, grammar, and formatting. They also confirmed that each multiple-choice item had a single correct answer.

### **2.14. Final Eyes Committees**

After NYSED and Questar reviewed copies of the test forms, the test forms were reviewed by the Final Eyes committees. For each content area, the committee consisted of nine New York State educators from around the State. During that review, the educators were charged with taking the test to make sure that each multiple-choice item had a single correct answer, and to look for errors in spelling, capitalization, punctuation, grammar, and formatting. Appendix R contains the full Final Eyes meeting report.

After the Final Eyes review and after NYSED approved edits made as a result of the review, the tests were then considered final and produced for the April 2016 administration.

### **2.15. Proficiency and Performance Standards**

In Summer 2013, after the operational administration of the 2013 tests, a standard setting meeting occurred in Albany where 95 New York State educators went through a rigorous process, guided by the best practices indicated by this intensely studied process, to recommend performance standards for the new tests measuring the CCLS. These recommendations were presented to the Commissioner and the Board of Regents, who, in turn, adopted the

recommended standards set forth by the committees. For additional details, see Section 8 and Appendix P in the 2013 technical report (NYSED, 2013).

Each grade level has four performance levels. Three cut points demarcate the performance levels needed to demonstrate each ascending level of performance. Section 6.8.1. Raw Score-to-Scale Score and SEM Conversion Tables contains detailed information related to performance standards.

## Section 3: Validity

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Validity refers to the degree to which evidence and theory support the interpretations of test scores entailed by the proposed uses of tests. Test validation is an ongoing process of gathering evidence from many sources to evaluate the soundness of the desired score interpretation or use. This evidence is acquired from studies of the content of the test and studies involving scores produced by the test. Additionally, reliability has to be considered before considerations of validity are made. A test cannot be valid if the test scores are not first reliable.

The *Standards for Educational and Psychological Testing* (AERA, APA, and NCME, 2014) addressed the concept of validity in testing, which refers to the appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores. Validity is the most important consideration in test evaluation. Test validation is the process of accumulating evidence to support any particular inference. Validity, however, is a unitary concept. Although evidence may be accumulated in many ways, validity refers to the degree to which evidence supports the inferences made from test scores.

### 3.1. Content Validity

Generally, achievement tests are used for student-level outcomes, either for making predictions about students or for describing students' performances (Mehrens and Lehmann, 1991). Tests are now also used for the purposes of accountability and adequate yearly progress (AYP). The NYSED uses various assessment data in reporting AYP. Specific to student-level outcomes, the NYSTP documents student performance in the area of Mathematics as defined by the New York State Common Core Mathematics Learning Standards and in the area of ELA as defined by the New York State Common Core ELA Learning Standards.

To allow test score interpretations appropriate for this purpose, the content of the test must be carefully matched to the specified standards. The 2014 AERA/APA/NCME standards state that content-related evidence of validity is a central concern during test development. Expert professional judgment should play an integral part in developing the definition of what is to be measured, such as describing the universe of the content, generating or selecting the content sample, and specifying the item format and scoring system.

Expert analysis of test content indicates the degree to which the content of a test covers the domain of content that the test is intended to measure. In the case of the NYSTP, the content is defined by detailed blueprints that describe New York State content standards and define the skills that must be measured to assess these content standards (see Tables B1 and B2 in Appendix B). The NYSTP test development process requires specific attention to content representation and the balance within each test form. New York State educators were involved in test construction in various development stages. For example, during the item review process, they reviewed field-test items for the alignment of the items with the CCLS. Educators also participated in a process of establishing scoring rubrics for constructed-response items during rangefinding. Section 2: Test Design and Development contains more information specific to the item review process.

### **3.2. Construct (Internal Structure) Validity**

Construct validity (i.e., what scores mean and what kind of inferences they support) is often considered the most important type of test validity. Construct validity of the NYSTP Grades 3–8 ELA and Mathematics Tests are supported by several types of evidence that can be obtained from the ELA and Mathematics test data.

#### *3.2.1. Internal Consistency*

Empirical studies of the internal structure of the test provide one type of evidence of construct validity. For example, high internal consistency constitutes evidence of validity. This is because high coefficients imply that the test items are measuring the same domain of skill and are reliable and consistent. Reliability coefficients of the tests for total populations and subgroups of students are presented in Section 7.1: Test Reliability. For the total population, the ELA reliability coefficients (Cronbach’s alpha) ranged from .89 to .92. For all subgroups, the reliability coefficients were greater than or equal to .81. For the total population, the Mathematics reliability coefficients (Cronbach’s alpha) ranged from .93 to .95. For all subgroups, the reliability coefficients were greater than or equal to .80. Overall, high internal consistency of the NYSTP Grades 3–8 Common Core ELA and Mathematics Tests provided sound evidence of construct validity.

#### *3.2.2. Unidimensionality*

Other validity evidence comes from analyses of the degree to which the test items conform to the requirements of the statistical models. These statistical models are used to scale and link the tests, as well as to generate student scores. The models require that the items fit the model well (item fit) and that the items in a test measure a single domain of skill (unidimensionality).

The first step is to assess the degree to which the items fit the IRT model. The item-model fit for the ELA and Mathematics tests was assessed using  $Q_I$  statistics (Yen, 1981), and the results are described in detail in Section 6: IRT Calibration and Linking. Most items demonstrated sound fit across grades and content areas, and only a few items were deemed to have deviate fit. This provides solid evidence for the appropriateness of the IRT models used to calibrate and scale the test data.

Additional evidence for the efficacy of the model involves demonstrating that the items on the New York State tests are related to each other, within their respective content areas. This relationship of the items within the ELA or Mathematics tests is the common proficiency acquired by students studying the content area. This “common proficiency,” or, more formally, underlying construct, could be labeled as ELA proficiency (using the ELA scores) or Mathematics proficiency (using the mathematics scores), depending on the degree to which the ELA and Mathematics items are related.

Factor analysis of the test data is one way of modeling the common construct. This analysis may show that there is a single or main factor that can account for much of the variability between responses to test items. A large first component in factor analysis would provide evidence of the latent proficiency that students have in common regarding the particular items asked. A large main factor found from a factor analysis of an achievement test would suggest a primary

construct that may be related to what the items were designed to have in common (i.e., Mathematics proficiency or ELA proficiency).

To demonstrate the common factor underlying student responses to the ELA and Mathematics test items, principal component factor analyses were conducted on a correlation matrix of individual items for the ELA and Mathematics tests. Factoring a correlation (i.e., tetrachoric correlation) matrix rather than actual item response data is preferable when dichotomous variables are in the analyzed data set. Because the ELA and Mathematics tests contain both multiple-choice and constructed-response items, the matrices of *polychoric* correlations were used as input for the factor analyses, as polychoric correlations are appropriate with both multiple-choice and constructed-response data. The study was conducted on the New York State public, charter, and non-public school students for whom data were available during the linking process. A large first principal component was evident in each analysis, demonstrating essential unidimensionality of the trait (i.e., proficiency) measured by each test. In other words, statistical evidence indicates that the ELA items are measuring one underlying construct, ELA proficiency, and that the Mathematic items are measuring one underlying construct, Mathematics proficiency.

The factor analyses conducted with the ELA and Mathematics data will show almost as many underlying constructs, or factors, as there are items on the test. Therefore, it is necessary to further investigate the factor analysis results to determine the number of “meaningful” factors. Specifically, more than one factor with an eigenvalue greater than 1.0 present in each dataset would suggest the presence of small additional factors. The magnitude of the ratio of the variance accounted for by the first factor compared to the remaining factors also provides evidence as to the number of meaningful factors. In addition, the total amount of variance accounted for by the main factor was evaluated. According to M. Reckase (1979),

“... the 1PL and the 3PL models estimate different abilities when a test measures independent factors, but ... both estimate the first principal component when it is large relative to the other factors. In this latter case, good ability estimates can be obtained from the models, even when the first factor accounts for less than 10 percent of the test variance, although item calibration results will be unstable.”

Factor analyses related to the Grades 3–8 Common Core ELA and Mathematics Tests indicated that the ratio of the variance accounted for by the first factor to the remaining factors was sufficiently large to support the claim that the ELA and Mathematics tests were essentially unidimensional; the ELA-related ratios and the Mathematics-related ratios showed that the first eigenvalues were at least five times as large as the second eigenvalues for all of the grades.

All of the Grades 3–8 Common Core ELA and Mathematics Tests exhibited first principal component accounting for more than 19% and 31% of the test variance, respectively. Tables 3.1 and 3.2 present the results of factor analyses, including eigenvalues greater than 1.0 and proportions of variance explained by the extracted factors, for ELA and Mathematics, respectively.

The evidence in Table 3.1 supports the claim that one single construct underlies the items/tasks in each ELA test and that scores from each test would represent performance primarily determined by that construct. Construct-irrelevant variance does not appear to create significant nuisance factors. Similarly, Table 3.2 supports the claim that a common construct underlies the

items/tasks in each Mathematics test and that scores from each test would represent performance primarily determined by that construct. Construct-irrelevant variance does not appear to create significant nuisance factors.

**Table 3.1. ELA Tests Factor Analysis**

| Grade | Extracted Factor |              |                        |              |
|-------|------------------|--------------|------------------------|--------------|
|       | #                | Initial      | Variance Accounted for |              |
|       |                  | Eigenvalue   | %                      | Cumulative % |
| 3     | 1                | <b>8.56</b>  | <b>25.19</b>           | <b>25.19</b> |
|       | 2                | 1.46         | 4.30                   | 29.49        |
|       | 3                | 1.26         | 3.72                   | 33.21        |
| 4     | 1                | <b>7.38</b>  | <b>21.70</b>           | <b>21.70</b> |
|       | 2                | 1.43         | 4.22                   | 25.92        |
|       | 3                | 1.03         | 3.04                   | 28.95        |
| 5     | 1                | <b>9.14</b>  | <b>20.76</b>           | <b>20.76</b> |
|       | 2                | 1.63         | 3.70                   | 24.46        |
|       | 3                | 1.29         | 2.94                   | 27.41        |
|       | 4                | 1.02         | 2.32                   | 29.72        |
| 6     | 1                | <b>8.33</b>  | <b>18.93</b>           | <b>18.93</b> |
|       | 2                | 1.61         | 3.67                   | 22.60        |
|       | 3                | 1.14         | 2.59                   | 25.19        |
|       | 4                | 1.09         | 2.47                   | 27.66        |
|       | 5                | 1.03         | 2.35                   | 30.01        |
| 7     | 1                | <b>9.32</b>  | <b>21.18</b>           | <b>21.18</b> |
|       | 2                | 1.59         | 3.61                   | 24.79        |
|       | 3                | 1.10         | 2.51                   | 27.29        |
|       | 4                | 1.04         | 2.35                   | 29.65        |
| 8     | 1                | <b>10.41</b> | <b>23.66</b>           | <b>23.66</b> |
|       | 2                | 1.68         | 3.81                   | 27.47        |
|       | 3                | 1.31         | 2.97                   | 30.44        |
|       | 4                | 1.00         | 2.28                   | 32.72        |

**Table 3.2. Mathematics Tests Factor Analysis**

| Grade | Extracted Factor |              |                        |              |
|-------|------------------|--------------|------------------------|--------------|
|       | #                | Initial      | Variance Accounted for |              |
|       |                  | Eigenvalue   | %                      | Cumulative % |
| 3     | 1                | <b>11.42</b> | <b>25.39</b>           | <b>25.39</b> |
|       | 2                | 1.58         | 3.51                   | 28.90        |
|       | 3                | 1.13         | 2.51                   | 31.41        |
|       | 4                | 1.10         | 2.45                   | 33.86        |
| 4     | 1                | <b>14.66</b> | <b>30.54</b>           | <b>30.54</b> |
|       | 2                | 1.33         | 2.76                   | 33.30        |
|       | 3                | 1.22         | 2.54                   | 35.84        |
|       | 4                | 1.13         | 2.36                   | 38.20        |
| 5     | 1                | <b>12.70</b> | <b>27.02</b>           | <b>27.02</b> |
|       | 2                | 1.84         | 3.92                   | 30.95        |
|       | 3                | 1.05         | 2.24                   | 33.19        |
|       | 4                | 1.02         | 2.16                   | 35.35        |
|       | 5                | 1.00         | 2.13                   | 37.48        |
| 6     | 1                | <b>12.79</b> | <b>24.13</b>           | <b>24.13</b> |
|       | 2                | 1.74         | 3.28                   | 27.41        |
|       | 3                | 1.10         | 2.08                   | 29.49        |
| 7     | 1                | <b>14.34</b> | <b>26.56</b>           | <b>26.56</b> |
|       | 2                | 1.53         | 2.83                   | 29.39        |
|       | 3                | 1.17         | 2.17                   | 31.56        |
| 8     | 1                | <b>12.16</b> | <b>22.52</b>           | <b>22.52</b> |
|       | 2                | 1.49         | 2.77                   | 25.29        |
|       | 3                | 1.30         | 2.40                   | 27.69        |
|       | 4                | 1.00         | 1.86                   | 29.55        |

As additional evidence for construct validity, the same factor analysis procedure was employed to assess the dimensionality of the Mathematics construct for selected subgroups of students in each grade: English language learners (ELLs), students with disabilities (SWD), and students using test accommodations (SUA). The results were comparable to the results obtained from the total population data. Evaluation of eigenvalue magnitude and proportions of variance explained by the main and secondary factors provide evidence of essential unidimensionality of the construct measured by the tests for the analyzed subgroups. Appendix L provides factor analysis results for ELL, SWD, SUA, ELL/SUA, and SWD/SUA classifications. The ELL/SUA subgroup is defined as examinees who are ELLs and who use at least one ELL-related accommodation. The SWD/SUA subgroup includes examinees who are classified as having disabilities and who use at least one disability-related accommodation.



### 3.2.3. *Detection of Bias*

Minimizing item bias has the goal of minimizing construct-irrelevant variance and helps establish a strong validity argument for the tests. Specifically, bias occurs if items function differentially for key pairs of groups, which may, in turn, cause the test to be differentially valid for certain groups of test takers. The statistical means for flagging items that may exhibit bias is referred to as differential item functioning (DIF). These statistical procedures were designed to be conservative (i.e., they were designed to flag more items for DIF, rather than fewer). Therefore, it is rare in practice to observe a high-stakes test in which not a single item is flagged for DIF. Since these procedures tend to over-flag items, it is only through review of those flagged items by experts that the items flagged for DIF may be judged to have or be free of bias. If the test involves irrelevant skills or knowledge, the possibility of bias is increased. Thus, preserving content validity is essential.

The developers of the NYSTP tests gave careful attention to items of possible ethnic, gender, socioeconomic status (SES), and—only for the Mathematics tests—translation bias. All materials were written and reviewed to conform to Questar’s editorial policies and guidelines for equitable assessment, as well as NYSED’s guidelines for item development. All materials were written to NYSED’s specifications and carefully checked by groups of trained New York State educators during the item review process. These steps are essential in keeping bias to a minimum. However, current evidence suggests that expertise in this area is no substitute for data; reviewers are sometimes wrong about which items work to the disadvantage of a group, apparently because some of their ideas about how students will react to items may be faulty (Sandoval and Mille, 1979; Jensen, 1980). Thus, empirical studies were conducted.

Statistical methods were used to identify items exhibiting possible DIF. Although items flagged for DIF in the field-test stage were closely examined for content bias and avoided during the operational test construction, DIF analyses were conducted again on operational test data. Different methods were employed to evaluate the amount of DIF in all test items: constructed-response items were evaluated with standardized mean differences, and multiple-choice items were analyzed using Mantel-Haenszel methods (see Section 5: Operational Test Data Collection and Classical Analysis).

In each grade, for both ELA and Mathematics, few items were flagged for DIF. Moreover, the magnitude of DIF for the flagged items was typically small (for more details, see Appendix N). In addition, very few items were flagged by multiple methods. Items flagged for statistically significant DIF were carefully reviewed by multiple reviewers during the operational test item selection. All such items were deemed by the reviewers to be free of bias (i.e., judged not to adversely affect any demographic subgroup studied) and remained in the tests.

## **Section 4: Test Administration and Scoring**

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This section provides summaries of New York State test administration and scoring procedures. For further information, refer to the aforementioned School Administrator’s Manual and the *New York State Scoring Leader Handbook (2016)* located here:

<http://www.p12.nysed.gov/assessment/sam/ei/scoringleaderhb16rev2.pdf>.

### **4.1. Test Administration**

The NYSTP Grades 3–8 Common Core ELA and Mathematics Tests were administered to students during April 2016. The testing window was Monday, April 4 – Thursday, April 7 for the Grades 3–8 Common Core ELA Tests and Wednesday, April 13 – Friday, April 15 for the Grades 3–8 Common Core Mathematics Tests. The makeup test administration window was Friday, April 8 – Tuesday, April 12 for the Grades 3–8 Common Core ELA Tests and Monday, April 18 – Wednesday, April 20 for the Grades 3–8 Common Core Mathematics Tests. The makeup test administration windows allowed students who were ill or otherwise unable to test during the assigned window to take the tests.

### **4.2. Scoring Procedures of Operational Tests**

The scoring of the NYSTP 2016 Grades 3–8 Common Core ELA and Mathematics Tests was performed at designated sites by qualified teachers and administrators. The number of personnel at a given site varied, as districts have the option of regional, district-wide, or school-wide scoring (please refer to Section 4.3: Scoring Models for more details). Administrators were responsible for the oversight of scoring operations, including the preparation of the test site, the security of test books, and the supervision of the scoring process. At each site, designated trainers taught scoring committee members the basic criteria for scoring each item and monitored the scoring sessions in the room. The trainers were assisted by facilitators or leaders, who also helped in monitoring the sessions and enforced scoring accuracy.

The titles for administrators, trainers, and facilitators vary by the scoring model that is selected. At the regional level, oversight was conducted by a site coordinator. A scoring leader trained the scoring committee members and monitored the sessions, and a table facilitator assisted in monitoring the sessions. For each subject, the oversight was structured in the same way for district- and school-wide models. At the district-wide level, a school district administrator oversaw scoring. A district subject leader trained the scoring committee members and monitored the sessions, and a school subject leader assisted in monitoring the sessions. For school-wide scoring, oversight was provided by the principal; otherwise, titles for the school-wide model were the same as those for the district-wide model. The general title “scoring-committee members” included scorers at every site.

### **4.3. Scoring Models**

For the 2015–2016 school year, schools and school districts were able to score Grades 3–8 Common Core ELA and/or Mathematics Tests regionally, multi-district, district-wide, or school-wide, based on local need. Schools were required to enter one of the following scoring model codes on student answer sheets:

1. Regional scoring—The scorers for the school’s test papers included either staff from three or more school districts or staff from all non-public schools in an affiliation group (non-public or charter schools may participate in regional scoring with public school districts, and may be counted as one district).
2. Schools from two districts—The scorers for the school’s test papers included staff from two school districts, non-public schools, charter school districts, or a combination thereof.
3. Three or more schools within a district—The scorers for the school’s test papers included staff from all schools administering this test in a district, provided at least three schools are represented.
4. Two schools within a district—The scorers for the school’s test papers included staff from all schools administering this test in a district, provided that two schools are represented.
5. One school, only (local scoring)—The first readers for the school’s test papers included staff from the only school in the district administering this test, staff from one charter school, or staff from one non-public school.
6. Private contractor — Scored by a private contractor that does not belong to Boards of Cooperative Educational Services (BOCES).

Schools and districts were instructed to carefully analyze their individual needs and capacities to determine their appropriate scoring model. BOCES and the Staff and Curriculum Development Network (SCDN) provided districts with technical support and advice in making this decision.

#### **4.4. Scoring of Constructed-Response Items**

The key resource for both the training of scoring committee members and the scoring of CR items was the scoring guides. These documents were created by Questar from sets of actual field-test student responses that were consensus scored by NYSED and New York State teachers during Rangefinding sessions. Trainers used these materials to train scoring-committee members on the criteria for scoring CR items. Additionally, scoring leader handbooks were also distributed to outline the responsibilities of the scoring roles.

Upon completion of the training of scoring committee members, scoring was conducted with pen-and-pencil scoring as opposed to electronic scoring, and each scoring-committee member evaluated actual student papers instead of electronically scanned papers. All scoring-committee members were trained by previously trained and approved trainers along with guidance from scoring guides. Each constructed-response test book was scored by three separate scoring committee members, who scored three distinct sections of the test book. After test books were completed, the table facilitator or subject (ELA or mathematics) leader conducted a “read behind” of approximately 12 sets of test books per hour to verify the accuracy of scoring. If an item arose that was not covered in the training materials, facilitators or trainers were to call the Questar Scoring Helpline for assistance with the ELA or mathematics scoring (see Section 4.6. Quality Control Process).

#### **4.5. Scorer Qualifications and Training**

The scoring of the 2016 Grades 3–8 Common Core ELA and Mathematics Tests was conducted by qualified administrators and teachers. Trainers used the scoring guides to train scoring-committee members on the criteria for scoring constructed-response items. Part of the training process was the administration of a consistency assurance set (CAS) that provided the State’s scoring sites with information regarding strengths and weaknesses of their scorers. This tool

allowed trainers to retrain their scorers, if necessary. The CAS also acknowledged those scorers who had grasped all aspects of the content area being scored and was well prepared to score student responses.

Regardless of the scoring model used, a minimum of three scorers is necessary to score each student's test. However, to comply with a State requirement, none of the scorers assigned to score a student's test responses may be that student's teacher. This policy is detailed in the *Scoring Leader Handbook* section "Assigning Scorer Numbers and Questions to Scoring Committee Members" on page 21, found online at:

<http://www.p12.nysed.gov/assessment/sam/ei/scoringleaderhb16rev2.pdf>.

#### **4.6. Quality Control Process**

Test books were randomly distributed throughout each scoring room so that books from each region, district, school, or class were evenly dispersed. Teams were divided into groups of three to ensure that a variety of scorers graded each book. If a scorer and a facilitator could not reach a decision on a paper after reviewing the scoring guides and audio files, they called the Questar Scoring Helpline. The call center was established to help teachers and administrators during scoring. The help-line staff consisted of trained Questar personnel, who answered items by phone or fax. When a member of the staff was unable to resolve an issue, it was referred to NYSED for a scoring decision. A quality check was also performed on each completed box of scored tests to certify that all of the items were scored and that the scoring-committee members darkened each score on the answer document appropriately. The log of calls received by the scoring helpline was delivered to NYSED twice daily during the scoring window. To affirm that all schools across the state adhered to scoring guidelines and policies, approximately 5% of the schools' results are audited each year by an outside vendor.

## **Section 5: Operational Test Data Collection and Classical Analysis**

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### **5.1. Data Collection**

Test data were collected in two phases. During Phase 1, a sample of approximately 95% of the student test records were received from the data warehouse and delivered to Questar, beginning at the end of May 2016. During Phase 2, “straggler files” were submitted to Questar in June 2016.

The straggler files contained fewer than about 5% of the total population cases, and were excluded from the classical, IRT, and reliability analyses (as described in Sections 5, 6, and 7, respectively) due to late submission. The analyses described in Section 8, “Summary of Operational Test Results,” were based on the data collected from both Phase 1 and Phase 2. Data collected from both public schools and non-public schools were included in all data analyses.

### **5.2. Data Processing**

Depending on the nature of the analysis, more student records were included in some analyses than in others. For example, all students with valid test scores were included in the analyses described in Section 8, “Summary of Operational Test Results.” For the analyses described in other sections, however, more stringent data cleaning procedures were applied (see details below).

Data processing here refers to the cleaning and screening procedures used to identify errors (such as out-of-range data), and the decisions made to exclude student cases or to suppress particular items in certain analyses. Questar’s psychometric team performed data cleaning to the delivered data, and excluded some student cases in order to obtain a sample of the utmost integrity. It should be noted that a student case being excluded from certain data analyses did not mean that the student record was invalidated. According to the NYSED’s specific instructions, additional procedures were taken to correct or recover these students’ records so that their test results were scored properly. As mentioned above, their records were included in later analyses (see Section 8).

The major groups of cases excluded from the data set (used for analyses in Sections 5, 6, and 7) were students with missing school type and those with at least one entirely missing test book. Other deleted cases included students with incorrect or incomplete grade information; duplicate record cases; and no-response record cases. The mathematical data cleaning procedure also excluded records with mismatched form language indicators for translated versions across the three test books for a given student.

#### ***5.2.1. Sampling Down for Representativeness***

Historically, after data cleaning, the sample is reviewed for representativeness of the prior year’s operational population (i.e., all students testing in Spring 2015) in terms of key variables such as student gender, racial/ethnic identity, student disability status, English Language Learner (ELL) status, presence of test accommodation(s), and school Needs/Resource Capacity Category (NRC). At the recommendation of New York State’s Assessment Technical Advisory Committee (TAC), Questar shifted the focus from sampling down according to demographic representativeness, to instead focus on matching the prior year’s population’s distribution of ability. Questar and NYSED still reviewed the demographic patterns for 2016 relative to 2015, but they were not used directly in the sampling down analyses. Comparison results between the

final 2016 sample and 2015 operational population are further described in Section 6, “IRT Calibration and Linking.” In Spring 2016, a sampling down approach was adopted to make the sample used for linking as similar as possible to the previous year’s testing population.

The numbers of cases considered for dropping because of sampling down varied across grades and subjects, but the process for all grades was consistent. The cleaned data file for a given subject and grade was the starting point. Questar reviewed the distribution of raw score proportion correct (RSPC) for the 2015 and 2016 operational forms. There were some minor differences in the 2015 and 2016 distributions of RSPC, but overall Questar, NYSED, and its TAC agreed that there was no evidence for a need to sample down in any subject or grade.

The data cleaning procedures and accompanying case counts are represented for ELA and Mathematics in Tables 5.1 – 5.6 and Tables 5.7 – 12, respectively.

**Table 5.1. ELA Grade 3 Data Cleaning**

| Exclusion Rule           | # Deleted | # Cases Remain |
|--------------------------|-----------|----------------|
| Initial Number of Cases  | n/a       | 175,071        |
| Wrong Subject            | 0         | 175,071        |
| No Grade                 | 1         | 175,070        |
| Wrong Grade              | 23        | 175,047        |
| Language Mismatched Form | 135       | 174,912        |
| School Type              | 34        | 174,878        |
| Missing Entire Book      | 1,169     | 173,709        |
| Invalid Score            | 0         | 173,709        |
| Out-of-Range CR Scores   | 0         | 173,709        |
| Duplicated Record        | 14        | 173,695        |

**Table 5.2. ELA Grade 4 Data Cleaning**

| Exclusion Rule           | # Deleted | # Cases Remain |
|--------------------------|-----------|----------------|
| Initial Number of Cases  | n/a       | 172,224        |
| Wrong Subject            | 0         | 172,224        |
| No Grade                 | 2         | 172,222        |
| Wrong Grade              | 13        | 172,209        |
| Language Mismatched Form | 132       | 172,077        |
| School Type              | 0         | 172,077        |
| Missing Entire Book      | 886       | 171,191        |
| Invalid Score            | 0         | 171,191        |
| Out-of-Range CR Scores   | 0         | 171,191        |
| Duplicated Record        | 6         | 171,185        |

**Table 5.3. ELA Grade 5 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 162,075               |
| Wrong Subject            | 0                | 162,075               |
| No Grade                 | 0                | 162,075               |
| Wrong Grade              | 21               | 162,054               |
| Language Mismatched Form | 176              | 161,878               |
| School Type              | 136              | 161,742               |
| Missing Entire Book      | 920              | 160,822               |
| Invalid Score            | 0                | 160,822               |
| Out-of-Range CR Scores   | 0                | 160,822               |
| Duplicated Record        | 14               | 160,808               |

**Table 5.4. ELA Grade 6 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 159,620               |
| Wrong Subject            | 0                | 159,620               |
| No Grade                 | 0                | 159,620               |
| Wrong Grade              | 21               | 159,599               |
| Language Mismatched Form | 220              | 159,379               |
| School Type              | 111              | 159,268               |
| Missing Entire Book      | 1,052            | 158,216               |
| Invalid Score            | 0                | 158,216               |
| Out-of-Range CR Scores   | 0                | 158,216               |
| Duplicated Record        | 6                | 158,210               |

**Table 5.5. ELA Grade 7 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 150,384               |
| Wrong Subject            | 0                | 150,384               |
| No Grade                 | 0                | 150,384               |
| Wrong Grade              | 29               | 150,355               |
| Language Mismatched Form | 146              | 150,209               |
| School Type              | 65               | 150,144               |
| Missing Entire Book      | 1,283            | 148,861               |
| Invalid Score            | 0                | 148,861               |
| Out-of-Range CR Scores   | 0                | 148,861               |
| Duplicated Record        | 4                | 148,857               |

**Table 5.6. ELA Grade 8 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 145,425               |
| Wrong Subject            | 0                | 145,425               |
| No Grade                 | 0                | 145,425               |
| Wrong Grade              | 37               | 145,388               |
| Language Mismatched Form | 147              | 145,241               |
| School Type              | 66               | 145,175               |
| Missing Entire Book      | 1,618            | 143,557               |
| Invalid Score            | 0                | 143,557               |
| Out-of-Range CR Scores   | 0                | 143,557               |
| Duplicated Record        | 2                | 143,555               |

**Table 5.7. Mathematics Grade 3 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 179,827               |
| Wrong Subject            | 0                | 179,827               |
| No Grade                 | 0                | 179,827               |
| Wrong Grade              | 29               | 179,798               |
| Language Mismatched Form | 481              | 179,317               |
| School Type              | 34               | 179,283               |
| Missing Entire Book      | 397              | 178,886               |
| Invalid Score            | 0                | 178,886               |
| Out-of-Range CR Scores   | 0                | 178,886               |
| Duplicated Record        | 16               | 178,870               |

**Table 5.8. Mathematics Grade 4 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 175,208               |
| Wrong Subject            | 0                | 175,208               |
| No Grade                 | 0                | 175,208               |
| Wrong Grade              | 13               | 175,195               |
| Language Mismatched Form | 535              | 174,660               |
| School Type              | 0                | 174,660               |
| Missing Entire Book      | 331              | 174,329               |
| Invalid Score            | 0                | 174,329               |
| Out-of-Range CR Scores   | 0                | 174,329               |
| Duplicated Record        | 8                | 174,321               |



**Table 5.9. Mathematics Grade 5 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 163,890               |
| Wrong Subject            | 0                | 163,890               |
| No Grade                 | 3                | 163,887               |
| Wrong Grade              | 19               | 163,868               |
| Language Mismatched Form | 454              | 163,414               |
| School Type              | 137              | 163,277               |
| Missing Entire Book      | 271              | 163,006               |
| Invalid Score            | 0                | 163,006               |
| Out-of-Range CR Scores   | 0                | 163,006               |
| Duplicated Record        | 14               | 162,992               |

**Table 5.10. Mathematics Grade 6 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 162,499               |
| Wrong Subject            | 0                | 162,499               |
| No Grade                 | 1                | 162,498               |
| Wrong Grade              | 27               | 162,471               |
| Language Mismatched Form | 735              | 161,736               |
| School Type              | 103              | 161,633               |
| Missing Entire Book      | 411              | 161,222               |
| Invalid Score            | 0                | 161,222               |
| Out-of-Range CR Scores   | 0                | 161,222               |
| Duplicated Record        | 6                | 161,216               |

**Table 5.11. Mathematics Grade 7 Data Cleaning**

| <b>Exclusion Rule</b>    | <b># Deleted</b> | <b># Cases Remain</b> |
|--------------------------|------------------|-----------------------|
| Initial Number of Cases  | n/a              | 148,630               |
| Wrong Subject            | 0                | 148,630               |
| No Grade                 | 1                | 148,629               |
| Wrong Grade              | 39               | 148,590               |
| Language Mismatched Form | 648              | 147,942               |
| School Type              | 63               | 147,879               |
| Missing Entire Book      | 623              | 147,256               |
| Invalid Score            | 0                | 147,256               |
| Out-of-Range CR Scores   | 0                | 147,256               |
| Duplicated Record        | 4                | 147,252               |

**Table 5.12. Mathematics Grade 8 Data Cleaning**

| Exclusion Rule           | # Deleted | # Cases Remain |
|--------------------------|-----------|----------------|
| Initial Number of Cases  | n/a       | 116,810        |
| Wrong Subject            | 0         | 116,810        |
| No Grade                 | 2         | 116,808        |
| Wrong Grade              | 36        | 116,772        |
| Language Mismatched Form | 547       | 116,225        |
| School Type              | 73        | 116,152        |
| Missing Entire Book      | 960       | 115,192        |
| Invalid Score            | 0         | 115,192        |
| Out-of-Range CR Scores   | 0         | 115,192        |
| Duplicated Record        | 2         | 115,190        |

**5.3. Classical Analysis and Calibration Sample Characteristics**

The cleaned and sampled-down data sets included more than 98% of New York State students and were used for classical analyses, calibration, and linking. The demographic characteristics of students in these data sets are presented in Tables 5.13 – 5.18 and Tables 5.19 – 5.24 for ELA and Mathematics, respectively. The Needs/Resource Capacity Category (NRC) is assigned at the district level and is an indicator of district and school socioeconomic status. The ethnicity and gender designations are based on student-level information.

**Table 5.13. ELA Grade 3 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 86,132  | 49.59               |
|                      | Male             | 87,563  | 50.41               |
| Ethnicity            | Asian            | 17,910  | 10.31               |
|                      | Black            | 31,562  | 18.17               |
|                      | Hispanic         | 49,379  | 28.43               |
|                      | American Indian  | 1,204   | 0.69                |
|                      | Multiracial      | 4,343   | 2.50                |
|                      | Pacific Islander | 548     | 0.32                |
|                      | White            | 68,749  | 39.58               |
| NRC                  | New York         | 70,267  | 40.45               |
|                      | Big 4 Cities     | 7,489   | 4.31                |
|                      | Urban/Suburban   | 13,771  | 7.93                |
|                      | Rural            | 9,539   | 5.49                |
|                      | Average Needs    | 39,596  | 22.80               |
|                      | Low Needs        | 17,480  | 10.06               |
|                      | Charter School   | 9,645   | 5.55                |
|                      | Non-Public       | 5,908   | 3.40                |

| Demographic Category |     | N-Count | % of Total N-Count* |
|----------------------|-----|---------|---------------------|
| SWD                  | No  | 148,570 | 85.53               |
|                      | Yes | 25,125  | 14.47               |
| SUA                  | No  | 149,680 | 86.17               |
|                      | Yes | 24,015  | 13.83               |
| ELL                  | No  | 157,121 | 90.46               |
|                      | Yes | 16,574  | 9.54                |

\*The total n-count was 173,695.

**Table 5.14. ELA Grade 4 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 84,532  | 49.38               |
|                      | Male             | 86,653  | 50.62               |
| Ethnicity            | Asian            | 17,504  | 10.23               |
|                      | Black            | 31,862  | 18.61               |
|                      | Hispanic         | 47,741  | 27.89               |
|                      | American Indian  | 1,091   | 0.64                |
|                      | Multiracial      | 3,689   | 2.15                |
|                      | Pacific Islander | 627     | 0.37                |
|                      | White            | 68,671  | 40.12               |
| NRC                  | New York         | 68,816  | 40.20               |
|                      | Big 4 Cities     | 7,249   | 4.23                |
|                      | Urban/Suburban   | 13,092  | 7.65                |
|                      | Rural            | 9,061   | 5.29                |
|                      | Average Needs    | 37,617  | 21.97               |
|                      | Low Needs        | 16,928  | 9.89                |
|                      | Charter School   | 8,189   | 4.78                |
|                      | Non-Public       | 10,233  | 5.98                |
| SWD                  | No               | 145,066 | 84.74               |
|                      | Yes              | 26,119  | 15.26               |
| SUA                  | No               | 144,297 | 84.29               |
|                      | Yes              | 26,888  | 15.71               |
| ELL                  | No               | 156,299 | 91.30               |
|                      | Yes              | 14,886  | 8.70                |

\*The total n-count was 171,185.

**Table 5.15. ELA Grade 5 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 79,090  | 49.18               |
|                      | Male             | 81,718  | 50.82               |
| Ethnicity            | Asian            | 16,724  | 10.40               |
|                      | Black            | 30,617  | 19.04               |
|                      | Hispanic         | 44,779  | 27.85               |
|                      | American Indian  | 1,069   | 0.66                |
|                      | Multiracial      | 2,948   | 1.83                |
|                      | Pacific Islander | 450     | 0.28                |
|                      | White            | 64,221  | 39.94               |
| NRC                  | New York         | 66,871  | 41.58               |
|                      | Big 4 Cities     | 6,465   | 4.02                |
|                      | Urban/Suburban   | 12,182  | 7.58                |
|                      | Rural            | 8,489   | 5.28                |
|                      | Average Needs    | 35,820  | 22.28               |
|                      | Low Needs        | 16,833  | 10.47               |
|                      | Charter School   | 8,373   | 5.21                |
|                      | Non-Public       | 5,775   | 3.59                |
| SWD                  | No               | 134,107 | 83.40               |
|                      | Yes              | 26,701  | 16.60               |
| SUA                  | No               | 133,429 | 82.97               |
|                      | Yes              | 27,379  | 17.03               |
| ELL                  | No               | 148,795 | 92.53               |
|                      | Yes              | 12,013  | 7.47                |

\*The total n-count was 160,808.

**Table 5.16. ELA Grade 6 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 77,772  | 49.16               |
|                      | Male             | 80,438  | 50.84               |
| Ethnicity            | Asian            | 17,183  | 10.86               |
|                      | Black            | 30,271  | 19.13               |
|                      | Hispanic         | 42,276  | 26.72               |
|                      | American Indian  | 1,061   | 0.67                |
|                      | Multiracial      | 2,513   | 1.59                |
|                      | Pacific Islander | 425     | 0.27                |
|                      | White            | 64,481  | 40.76               |

| Demographic Category |                | N-Count | % of Total N-Count* |
|----------------------|----------------|---------|---------------------|
| NRC                  | New York       | 63,195  | 39.94               |
|                      | Big 4 Cities   | 6,393   | 4.04                |
|                      | Urban/Suburban | 10,898  | 6.89                |
|                      | Rural          | 8,184   | 5.17                |
|                      | Average Needs  | 34,109  | 21.56               |
|                      | Low Needs      | 17,046  | 10.77               |
|                      | Charter School | 9,189   | 5.81                |
|                      | Non-Public     | 9,196   | 5.81                |
| SWD                  | No             | 132,618 | 83.82               |
|                      | Yes            | 25,592  | 16.18               |
| SUA                  | No             | 132,198 | 83.56               |
|                      | Yes            | 26,012  | 16.44               |
| ELL                  | No             | 146,460 | 92.57               |
|                      | Yes            | 11,750  | 7.43                |

\*The total n-count was 158,210.

**Table 5.17. ELA Grade 7 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 72,555  | 48.74               |
|                      | Male             | 76,302  | 51.26               |
| Ethnicity            | Asian            | 16,249  | 10.92               |
|                      | Black            | 29,565  | 19.86               |
|                      | Hispanic         | 40,195  | 27.00               |
|                      | American Indian  | 1,098   | 0.74                |
|                      | Multiracial      | 2,036   | 1.37                |
|                      | Pacific Islander | 418     | 0.28                |
|                      | White            | 59,296  | 39.83               |
| NRC                  | New York         | 63,853  | 42.90               |
|                      | Big 4 Cities     | 5,892   | 3.96                |
|                      | Urban/Suburban   | 10,263  | 6.89                |
|                      | Rural            | 7,777   | 5.22                |
|                      | Average Needs    | 31,388  | 21.09               |
|                      | Low Needs        | 16,503  | 11.09               |
|                      | Charter School   | 8,180   | 5.50                |
|                      | Non-Public       | 5,001   | 3.36                |
| SWD                  | No               | 124,723 | 83.79               |
|                      | Yes              | 24,134  | 16.21               |

| Demographic Category |     | N-Count | % of Total N-Count* |
|----------------------|-----|---------|---------------------|
| SUA                  | No  | 124,861 | 83.88               |
|                      | Yes | 23,996  | 16.12               |
| ELL                  | No  | 138,515 | 93.05               |
|                      | Yes | 10,342  | 6.95                |

\*The total n-count was 148,857.

**Table 5.18. ELA Grade 8 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 69,999  | 48.76               |
|                      | Male             | 73,556  | 51.24               |
| Ethnicity            | Asian            | 16,027  | 11.16               |
|                      | Black            | 30,083  | 20.96               |
|                      | Hispanic         | 39,239  | 27.33               |
|                      | American Indian  | 920     | 0.64                |
|                      | Multiracial      | 1,599   | 1.11                |
|                      | Pacific Islander | 374     | 0.26                |
|                      | White            | 55,313  | 38.53               |
| NRC                  | New York         | 63,737  | 44.40               |
|                      | Big 4 Cities     | 5,721   | 3.99                |
|                      | Urban/Suburban   | 9,184   | 6.40                |
|                      | Rural            | 7,307   | 5.09                |
|                      | Average Needs    | 28,192  | 19.64               |
|                      | Low Needs        | 14,983  | 10.44               |
|                      | Charter School   | 6,816   | 4.75                |
|                      | Non-Public       | 7,615   | 5.30                |
| SWD                  | No               | 121,096 | 84.36               |
|                      | Yes              | 22,459  | 15.64               |
| SUA                  | No               | 120,996 | 84.29               |
|                      | Yes              | 22,559  | 15.71               |
| ELL                  | No               | 133,460 | 92.97               |
|                      | Yes              | 10,095  | 7.03                |

\*The total n-count was 143,555.

**Table 5.19. Mathematics Grade 3 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 88,423  | 49.43               |
|                      | Male             | 90,447  | 50.57               |
| Ethnicity            | Asian            | 18,673  | 10.44               |
|                      | Black            | 32,281  | 18.05               |
|                      | Hispanic         | 51,194  | 28.62               |
|                      | American Indian  | 1,244   | 0.70                |
|                      | Multiracial      | 4,341   | 2.43                |
|                      | Pacific Islander | 578     | 0.32                |
|                      | White            | 70,559  | 39.45               |
| NRC                  | New York         | 71,888  | 40.19               |
|                      | Big 4 Cities     | 7,798   | 4.36                |
|                      | Urban/Suburban   | 13,776  | 7.70                |
|                      | Rural            | 9,429   | 5.27                |
|                      | Average Needs    | 39,072  | 21.84               |
|                      | Low Needs        | 17,440  | 9.75                |
|                      | Charter School   | 9,565   | 5.35                |
|                      | Non-Public       | 9,902   | 5.54                |
| SWD                  | No               | 152,937 | 85.50               |
|                      | Yes              | 25,933  | 14.50               |
| SUA                  | No               | 154,205 | 86.21               |
|                      | Yes              | 24,665  | 13.79               |
| ELL                  | No               | 160,280 | 89.61               |
|                      | Yes              | 18,590  | 10.39               |

\*The total n-count was 178,870.

**Table 5.20. Mathematics Grade 4 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 85,869  | 49.26               |
|                      | Male             | 88,452  | 50.74               |
| Ethnicity            | Asian            | 18,124  | 10.40               |
|                      | Black            | 32,575  | 18.69               |
|                      | Hispanic         | 49,396  | 28.34               |
|                      | American Indian  | 1,114   | 0.64                |
|                      | Multiracial      | 3,693   | 2.12                |
|                      | Pacific Islander | 656     | 0.38                |
|                      | White            | 68,763  | 39.45               |

| Demographic Category |                | N-Count | % of Total N-Count* |
|----------------------|----------------|---------|---------------------|
| NRC                  | New York       | 70,160  | 40.25               |
|                      | Big 4 Cities   | 7,329   | 4.20                |
|                      | Urban/Suburban | 12,913  | 7.41                |
|                      | Rural          | 8,920   | 5.12                |
|                      | Average Needs  | 37,102  | 21.28               |
|                      | Low Needs      | 17,038  | 9.77                |
|                      | Charter School | 8,453   | 4.85                |
|                      | Non-Public     | 12,406  | 7.12                |
| SWD                  | No             | 147,733 | 84.75               |
|                      | Yes            | 26,588  | 15.25               |
| SUA                  | No             | 147,276 | 84.49               |
|                      | Yes            | 27,045  | 15.51               |
| ELL                  | No             | 158,012 | 90.64               |
|                      | Yes            | 16,309  | 9.36                |

\*The total n-count was 174,321.

**Table 5.21. Mathematics Grade 5 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 79,609  | 48.84               |
|                      | Male             | 83,383  | 51.16               |
| Ethnicity            | Asian            | 17,389  | 10.67               |
|                      | Black            | 31,457  | 19.30               |
|                      | Hispanic         | 46,546  | 28.56               |
|                      | American Indian  | 1,111   | 0.68                |
|                      | Multiracial      | 3,027   | 1.86                |
|                      | Pacific Islander | 484     | 0.30                |
|                      | White            | 62,978  | 38.64               |
| NRC                  | New York         | 68,243  | 41.87               |
|                      | Big 4 Cities     | 6,683   | 4.10                |
|                      | Urban/Suburban   | 11,954  | 7.33                |
|                      | Rural            | 8,188   | 5.02                |
|                      | Average Needs    | 34,960  | 21.45               |
|                      | Low Needs        | 16,695  | 10.24               |
|                      | Charter School   | 9,051   | 5.55                |
|                      | Non-Public       | 7,218   | 4.43                |
| SWD                  | No               | 136,016 | 83.45               |
|                      | Yes              | 26,976  | 16.55               |



| Demographic Category |     | N-Count | % of Total N-Count* |
|----------------------|-----|---------|---------------------|
| SUA                  | No  | 135,559 | 83.17               |
|                      | Yes | 27,433  | 16.83               |
| ELL                  | No  | 149,593 | 91.78               |
|                      | Yes | 13,399  | 8.22                |

\*The total n-count was 162,992.

**Table 5.22. Mathematics Grade 6 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 79,050  | 49.03               |
|                      | Male             | 82,166  | 50.97               |
| Ethnicity            | Asian            | 17,833  | 11.06               |
|                      | Black            | 31,008  | 19.23               |
|                      | Hispanic         | 43,781  | 27.16               |
|                      | American Indian  | 1,077   | 0.67                |
|                      | Multiracial      | 2,513   | 1.56                |
|                      | Pacific Islander | 455     | 0.28                |
|                      | White            | 64,549  | 40.04               |
| NRC                  | New York         | 64,335  | 39.91               |
|                      | Big 4 Cities     | 6,440   | 3.99                |
|                      | Urban/Suburban   | 10,412  | 6.46                |
|                      | Rural            | 7,757   | 4.81                |
|                      | Average Needs    | 33,015  | 20.48               |
|                      | Low Needs        | 16,735  | 10.38               |
|                      | Charter School   | 9,825   | 6.09                |
|                      | Non-Public       | 12,697  | 7.88                |
| SWD                  | No               | 135,817 | 84.25               |
|                      | Yes              | 25,399  | 15.75               |
| SUA                  | No               | 135,817 | 84.25               |
|                      | Yes              | 25,399  | 15.75               |
| ELL                  | No               | 147,846 | 91.71               |
|                      | Yes              | 13,370  | 8.29                |

\*The total n-count was 161,216.

**Table 5.23. Mathematics Grade 7 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 71,650  | 48.66               |
|                      | Male             | 75,602  | 51.34               |
| Ethnicity            | Asian            | 16,614  | 11.28               |
|                      | Black            | 29,690  | 20.16               |
|                      | Hispanic         | 41,116  | 27.92               |
|                      | American Indian  | 1,087   | 0.74                |
|                      | Multiracial      | 1,942   | 1.32                |
|                      | Pacific Islander | 432     | 0.29                |
|                      | White            | 56,371  | 38.28               |
| NRC                  | New York         | 64,686  | 43.93               |
|                      | Big 4 Cities     | 5,826   | 3.96                |
|                      | Urban/Suburban   | 9,475   | 6.43                |
|                      | Rural            | 7,140   | 4.85                |
|                      | Average Needs    | 28,987  | 19.69               |
|                      | Low Needs        | 15,649  | 10.63               |
|                      | Charter School   | 8,474   | 5.75                |
|                      | Non-Public       | 7,015   | 4.76                |
| SWD                  | No               | 123,823 | 84.09               |
|                      | Yes              | 23,429  | 15.91               |
| SUA                  | No               | 124,359 | 84.45               |
|                      | Yes              | 22,893  | 15.55               |
| ELL                  | No               | 135,967 | 92.34               |
|                      | Yes              | 11,285  | 7.66                |

\*The total n-count was 147,252.

**Table 5.24. Mathematics Grade 8 Sample Characteristics**

| Demographic Category |                  | N-Count | % of Total N-Count* |
|----------------------|------------------|---------|---------------------|
| Gender               | Female           | 55,286  | 48.00               |
|                      | Male             | 59,904  | 52.00               |
| Ethnicity            | Asian            | 11,147  | 9.68                |
|                      | Black            | 26,458  | 22.97               |
|                      | Hispanic         | 35,547  | 30.86               |
|                      | American Indian  | 761     | 0.66                |
|                      | Multiracial      | 1,184   | 1.03                |
|                      | Pacific Islander | 315     | 0.27                |
|                      | White            | 39,778  | 34.53               |

| Demographic Category |                | N-Count | % of Total N-Count* |
|----------------------|----------------|---------|---------------------|
| NRC                  | New York       | 53,996  | 46.88               |
|                      | Big 4 Cities   | 5,128   | 4.45                |
|                      | Urban/Suburban | 7,474   | 6.49                |
|                      | Rural          | 5,520   | 4.79                |
|                      | Average Needs  | 18,111  | 15.72               |
|                      | Low Needs      | 8,222   | 7.14                |
|                      | Charter School | 5,926   | 5.14                |
|                      | Non-Public     | 10,813  | 9.39                |
| SWD                  | No             | 94,527  | 82.06               |
|                      | Yes            | 20,663  | 17.94               |
| SUA                  | No             | 94,830  | 82.32               |
|                      | Yes            | 20,360  | 17.68               |
| ELL                  | No             | 103,743 | 90.06               |
|                      | Yes            | 11,447  | 9.94                |

\*The total n-count was 115,190.

## 5.4. Classical Data Analysis

Classical data analysis of the NYSTP Grades 3–8 ELA and Mathematics Tests consists of several important elements. One element is the analysis of item-level statistical information about student performance. It is important to verify that the items and test forms function as intended. If any serious error were to occur with an item (e.g., a printing error or two correct answers to one item), item analysis is the stage at which errors should be flagged and evaluated for rectification (suppression, credit, or other acceptable solution). Analyses of test-level data comprise the second element of classical data analysis. These include examination of the raw score (RS) statistics (mean and standard deviation or “SD”) and test reliability measures Cronbach’s alpha (Cronbach, 1951) and Feldt-Raju coefficient (Qualls, 1995). Additionally, classical DIF analysis is conducted at this stage. DIF analysis includes computation of standardized mean differences and Mantel-Haenszel statistics for New York State items to identify potential item bias. All classical data analysis results contribute information on the validity and reliability of the tests (see also Section 3, “Validity,” and Section 7, “Reliability and Standard Error of Measurement”).

### 5.4.1. Item Difficulty and Point Biserial Correlation Coefficients

Item difficulty is classically measured by the p-value statistic. It assesses the proportion of students who responded correctly to each MC item or the average proportion of the maximum score that students earned on each CR item. It is important to have a good range of p-values to increase test information and to avoid floor or ceiling effects. P-values represent the overall degree of difficulty, but do not account for demonstrated student performance on other test items. Usually, p-value information is coupled with point biserial (pbis) statistics, to verify that items are functioning as intended. In Appendix M, Tables M1–M12 illustrate classical test statistics for all items on each grade-level test. Appendix F provides general psychometric guidelines for operational item selection.

Item difficulties (p-values) for the ELA tests ranged from 0.29 to 0.96. For Grade 3, the item p-values ranged from 0.30 to 0.90, with a mean of 0.57. For Grade 4, the item p-values ranged from 0.39 to 0.75, with a mean of 0.55. For Grade 5, the item p-values ranged from 0.36 to 0.87, with a mean of 0.62. For Grade 6, the item p-values ranged from 0.33 to 0.78, with a mean of 0.57. For Grade 7, the item p-values ranged from 0.29 to 0.79, with a mean of 0.57. For Grade 8, the item p-values ranged from 0.42 to 0.96, with a mean of 0.68. These p-value statistics are in Appendix M, Tables M1–M6, along with other classical test statistics of the keys.

Item difficulties (p-values) on the Mathematics tests ranged from 0.12 to 0.90. For Grade 3, the item p-values ranged from 0.24 to 0.90, with a mean of 0.63. For Grade 4, the item p-values ranged from 0.23 to 0.83, with a mean of 0.61. For Grade 5, the item p-values ranged from 0.20 to 0.86, with a mean of 0.56. For Grade 6, the item p-values ranged from 0.12 to 0.85, with a mean of 0.51. For Grade 7, the item p-values ranged from 0.28 to 0.80, with a mean of 0.49. For Grade 8, the item p-values ranged from 0.19 to 0.83, with a mean of 0.49. These statistics are provided in Appendix M, Tables M7–M12, along with other classical test statistics.

Point-biserial statistics are used to examine item-test correlations, or item discrimination, for MC items. The pbis correlation for the key (i.e., the correct answer) is a measure of internal consistency, while pbis for specific response options aid in flagging possible alternate keys; each is a correlation that ranges between  $\pm 1$ . It is the correlation of students' responses to an item relative to their performance on the rest of the test and, unless otherwise noted, this discussion will be limited to the point biserial of the correct response with the remainder of the test.

Point-biserial correlations are presented in Appendix M Tables M1–M12. The column labeled “Pbis Key” contains the point biserial correlation associated with the correct response. The guideline for building the NYSTP Grades 3–8 Common Core ELA and Mathematics Tests was that the point-biserial correlation for the key for MC items should be equal to or greater than .20, which would indicate that students who responded correctly to that item also tended to do well on the overall test. There were very few exceptions to this guideline, due to content considerations, which required the inclusion of particular items. Decisions to use such items were made very carefully, and no item with a negative point-biserial correlation was allowed on the test.

Point biserials for correct answer options on the ELA tests ranged from 0.09 to 0.72, as shown in Appendix M, Tables M1–M6. For Grade 3, the item pbis values ranged from 0.30 to 0.65, with a mean of 0.45. For Grade 4, the item pbis values ranged from 0.22 to 0.70, with a mean of 0.40. For Grade 5, the item pbis values ranged from 0.16 to 0.67, with a mean of 0.40. For Grade 6, the item pbis values ranged from 0.13 to 0.71, with a mean of 0.37. For Grade 7, the item pbis values ranged from 0.16 to 0.72, with a mean of 0.40. For Grade 8, the item pbis values ranged from 0.09 to 0.72, with a mean of 0.43.

Point biserials for correct answer options on the Mathematics tests ranged from 0.03 to 0.75, as shown in Appendix M, Tables M7–M12. For Grade 3, the item pbis values ranged from 0.23 to 0.69, with a mean of 0.46. For Grade 4, the item pbis values ranged from 0.28 to 0.73, with a mean of 0.52. For Grade 5, the item pbis values ranged from 0.03 to 0.69, with a mean of 0.48. For Grade 6, the item pbis values ranged from 0.21 to 0.70, with a mean of 0.45. For Grade 7,

the item pbis values ranged from 0.24 to 0.75, with a mean of 0.48. For Grade 8, the item pbis values ranged from 0.24 to 0.70, with a mean of 0.43.

#### 5.4.2. *Omit Rates*

Omit rates (i.e., percentage of students not answering a given item) are routinely checked, based on test data, after each administration. Tables M1–M12 in Appendix M show the omit rates for items on the Grades 3–8 Common Core ELA and Mathematics Tests, respectively. The industry standard general rule of thumb is that omit rates for multiple-choice items should be less than 5.0%. Omit rates across multiple-choice and constructed-response items on the Grades 3–8 Common Core ELA and Mathematics Tests typically ranged from 0% to 3%. As may be expected, omit rates tended to increase for items at the end of the test booklets. That is, omit rates remained within the acceptable range for large-scale achievement tests.

#### 5.4.3. *Differential Item Functioning (DIF)*

Classical differential item functioning (DIF) analyses are statistical methods for identifying items that are estimated to have functioned differently for one group (i.e., the “focal” group) as compared with another group (i.e., the “reference” group). In other words, DIF analysis only *flags* items that may later be judged by content experts to exhibit bias, rather than directly detecting bias. First, the psychometric phenomenon of DIF was extensively investigated and experts’ judgments of bias collected when items were field-tested, which reduced the likelihood of including any differentially functioning items on the operational forms for 2015. Turning to the analysis of the 2015 operational data, as discussed in Section 3.2.3. Detection of Bias, items flagged for DIF do not necessarily indicate item bias. For example, DIF may be attributed to true group differences on the content measured by the item or Type I error, which refers to statistically flagging items that have no true DIF. Operational items flagged for DIF are given additional scrutiny by content specialists, above and beyond the existing rounds of reviews by New York State educators, and those content specialists make the final judgment as to whether or not an item is biased for or against the focal group.

DIF was evaluated using two methods, both of which involve checks on statistical and practical significance. First, the Mantel-Haenszel (MH) method is employed for MC items. This non-parametric DIF method partitions the sample of examinees into categories based on total raw test scores. It then compares the log-odds ratio of keyed responses for the focal and reference groups. In terms of statistical significance, the Mantel-Haenszel method has a critical value of 6.63 (degrees of freedom = 1 for MC items;  $\alpha = .01$ ) and as far as practical significance is concerned, it is compared to its corresponding delta-value. Delta-values are a commonly used metric in testing that indicates the magnitude of DIF. Typically, delta-values above 1.50 are considered indicative of moderate DIF that should be examined more closely (Zwick, Donoghue, and Grima, 1993). Second, the standardized mean difference (SMD) was computed for CR items. The SMD statistic (Dorans, Schmitt, and Bleistein, 1992) compares the mean scores of reference and focal groups, after adjusting for proficiency differences. The SMD was also evaluated for statistical significance and, in terms of practical significance, a moderate amount of DIF, for or against the focal group, is represented by an SMD with an absolute value between 0.10 and 0.19, inclusive; a large amount of DIF is represented by an SMD with an absolute value of 0.20 or greater.

Classical DIF analyses were conducted on subgroups of the Needs/Resource Capacity Category (focal group: High Needs; reference group: Low Needs), gender (focal group: Female; reference group: Male), ethnicity (focal groups: Black, Hispanic, and Asian; reference group: White), and English language learners (focal group: English language learners; reference group: Non-English language learners). The DIF analyses were conducted using all cases from the clean data sets. Table 5.29 and Table 5.30 show the numbers of cases for the subgroups for ELA and Mathematics, respectively.

**Table 5.25. ELA Classical DIF Sample N-Counts**

| Grade | Ethnicity |          |        |        | Gender |        | Needs/Resource Capacity |        | ELLs   |         |
|-------|-----------|----------|--------|--------|--------|--------|-------------------------|--------|--------|---------|
|       | Black     | Hispanic | Asian  | White  | Female | Male   | High                    | Low    | ELL    | Non-ELL |
| 3     | 31,562    | 49,379   | 17,910 | 68,749 | 86,132 | 87,563 | 101,066                 | 57,076 | 16,574 | 157,121 |
| 4     | 31,862    | 47,741   | 17,504 | 68,671 | 84,532 | 86,653 | 98,218                  | 54,545 | 14,886 | 156,299 |
| 5     | 30,617    | 44,779   | 16,724 | 64,221 | 79,090 | 81,718 | 94,007                  | 52,653 | 12,013 | 148,795 |
| 6     | 30,271    | 42,276   | 17,183 | 64,481 | 77,772 | 80,438 | 88,670                  | 51,155 | 11,750 | 146,460 |
| 7     | 29,565    | 40,195   | 16,249 | 59,296 | 72,555 | 76,302 | 87,785                  | 47,891 | 10,342 | 138,515 |
| 8     | 30,083    | 39,239   | 16,027 | 55,313 | 69,999 | 73,556 | 85,949                  | 43,175 | 10,095 | 133,460 |

**Table 5.26. Mathematics Classical DIF Sample N-Counts**

| Grade | Ethnicity |          |        |        | Gender |        | Needs/Resource Capacity |        | ELLs   |         |
|-------|-----------|----------|--------|--------|--------|--------|-------------------------|--------|--------|---------|
|       | Black     | Hispanic | Asian  | White  | Female | Male   | High                    | Low    | ELL    | Non-ELL |
| 3     | 32,281    | 51,194   | 18,673 | 70,559 | 88,423 | 90,447 | 102,891                 | 56,512 | 18,590 | 160,280 |
| 4     | 32,575    | 49,396   | 18,124 | 68,763 | 85,869 | 88,452 | 99,322                  | 54,140 | 16,309 | 158,012 |
| 5     | 31,457    | 46,546   | 17,389 | 62,978 | 79,609 | 83,383 | 95,068                  | 51,655 | 13,399 | 149,593 |
| 6     | 31,008    | 43,781   | 17,833 | 64,549 | 79,050 | 82,166 | 88,944                  | 49,750 | 13,370 | 147,846 |
| 7     | 29,690    | 41,116   | 16,614 | 56,371 | 71,650 | 75,602 | 87,127                  | 44,636 | 11,285 | 135,967 |
| 8     | 26,458    | 35,547   | 11,147 | 39,778 | 55,286 | 59,904 | 72,118                  | 26,333 | 11,447 | 103,743 |

Table 5.31 (ELA) and Table 5.32 (Mathematics) present the number of items flagged for DIF by either of the classical methods described earlier. Appendix N provides a detailed list of items flagged by either one or both of these classical DIF methods, including DIF direction and associated DIF statistics.

**Table 5.27. ELA Items Flagged for DIF**

| Grade | Flagged Items |
|-------|---------------|
| 3     | 2             |
| 4     | 4             |
| 5     | 10            |
| 6     | 6             |
| 7     | 9             |
| 8     | 8             |

Table 5.28. Mathematics Items Flagged for DIF

| Grade | Flagged Items |
|-------|---------------|
| 3     | 2             |
| 4     | 4             |
| 5     | 4             |
| 6     | 4             |
| 7     | 3             |
| 8     | 2             |

As discussed in Section 3: Validity, items showing statistically significant DIF (flagged as described above for MH statistics on MC items and SMD statistics for CR items) do not necessarily pose bias. The items flagged with DIF were examined by the content experts again, and no sign of potential bias was found. In other words, based on combinations of statistical and content evaluations, none of the items on the 3–8 tests showed bias.

## Section 6: IRT Calibration and Linking

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### 6.1. IRT Models and Rationale for Use

IRT allows for comparisons between items and scale scores, even those from different test forms, by using a common scale for all items and examinees (i.e., as if there were a hypothetical test that contained items from all forms). The three-parameter logistic (3PL) model (Lord and Novick, 1968; Lord, 1980) was used to analyze item responses on the MC items. For analysis of the CR items, the two-parameter partial credit (2PPC) model (Muraki, 1992; Yen, 1993) was used.

IRT is a statistical methodology that takes into account the fact that not all test items are alike and that not all test items provide the same amount of information in determining how much a student knows or can do. Computer programs that implement IRT models use actual student data to estimate the characteristics of the items on a test, called “parameters.” The parameter estimation process is called “item calibration.”

IRT models typically vary according to the number of parameters estimated. For the New York State tests, three parameters are estimated: the discrimination parameter, the difficulty parameter(s), and, for MC items, the guessing parameter. The discrimination parameter is an index of how well an item differentiates between high-performing and low-performing students. An item that cannot be answered correctly by low-performing students, but can be answered correctly by high-performing students, will have a high-discrimination value. The difficulty parameter is an index of how easy or difficult an item is. The higher the difficulty parameter is, the harder the item is. The guessing parameter is the probability that a student with very low proficiency will answer the item correctly.

Because the characteristics of MC and CR items are different, two IRT models were used in item calibration. The three-parameter logistic (3PL) model was used in the analysis of MC items. In this model, the probability that a student with proficiency  $\theta$  responds correctly to item  $i$  is

$$P_i(\theta) = c_i + \frac{1 - c_i}{1 + \exp[-1.7a_i(\theta - b_i)]},$$

where

$a_i$  is the item discrimination,  $b_i$  is the item difficulty, and  $c_i$  is the probability of a correct response from a very low-scoring student.

For analysis of the CR items, the 2PPC model was used. The 2PPC model is a special case of Bock’s (1972) nominal model. Bock’s model states that the probability of an examinee with proficiency  $\theta$  having a score  $(k - 1)$  at the  $k$ th level of the  $j$ th item is:

$$P_{jk}(\theta) = P(X_j = k - 1 | \theta) = \frac{\exp Z_{jk}}{\sum_{i=1}^{m_j} \exp Z_{ji}}, \quad k = 1 \text{ K } m_j,$$



where

$$Z_{jk} = A_{jk}\theta + C_{jk},$$

and

$k$  is the item response category ( $k = 1, 2, \dots, m_j$ ).

The  $m_j$  denotes the number of score levels for the  $j$ th item, and, typically, the highest score level is assigned  $(m_j - 1)$  score points. For the special case of the 2PPC model used here, the following constraints were used:

$$A_{jk} = \alpha_j(k-1),$$

and

$$C_{jk} = -\sum_{i=0}^{k-1} \gamma_{ji},$$

where

$$\gamma_{j0} = 0,$$

and

$\alpha_j$  and  $\gamma_{ji}$  are the free parameters to be estimated from the data.

Each item has  $(m_j - 1)$  independent  $\gamma_{ji}$  parameters and one  $\alpha_j$  parameter; a total of  $m_j$  parameters are estimated for each item.

## 6.2. Calibration Sample

The cleaned data were used for calibration and linking of the NYSTP 2016 Grades 3–8 Common Core ELA and Mathematics Tests. It should be noted that the sample sizes were adequate, as the calibration and linking were performed using nearly all (96–99%, depending on grade level) of the New York State public and non-public school student population data in each tested grade. As shown in Tables 6.1 – 6.3 and Tables 6.4 – 6.6 for ELA and Mathematics, respectively, the 2016 operational test samples were generally comparable to 2015 populations in terms of NRC, student race and ethnicity, proportions of ELLs, proportions of students with disabilities, and proportions of students using testing accommodations.

**Table 6.1. ELA Grades 3 and 4 Demographic Statistics**

| Demographic Category |                  | Grade 3            |                | Grade 4            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 49.08              | 49.59          | 49.23              | 49.38          |
|                      | Male             | 50.92              | 50.41          | 50.77              | 50.62          |
| Ethnicity            | Asian            | 9.84               | 10.31          | 9.72               | 10.23          |
|                      | Black            | 18.92              | 18.17          | 19.22              | 18.61          |
|                      | Hispanic         | 28.22              | 28.43          | 27.39              | 27.89          |
|                      | American Indian  | 0.66               | 0.69           | 0.62               | 0.64           |
|                      | Multiracial      | 2.20               | 2.50           | 1.81               | 2.15           |
|                      | Pacific Islander | 0.35               | 0.32           | 0.29               | 0.37           |
|                      | White            | 39.80              | 39.58          | 40.95              | 40.12          |
| NRC                  | New York         | 39.58              | 40.45          | 39.02              | 40.20          |
|                      | Big 4 Cities     | 4.24               | 4.31           | 3.99               | 4.23           |
|                      | Urban/Suburban   | 7.88               | 7.93           | 7.36               | 7.65           |
|                      | Rural            | 5.05               | 5.49           | 4.72               | 5.29           |
|                      | Average Needs    | 22.18              | 22.80          | 21.60              | 21.97          |
|                      | Low Needs        | 10.09              | 10.06          | 10.18              | 9.89           |
|                      | Charter          | 5.20               | 5.55           | 4.49               | 4.78           |
|                      | Non-Public       | 5.68               | 3.40           | 8.56               | 5.98           |
| SWD                  | No               | 84.89              | 85.53          | 84.24              | 84.74          |
|                      | Yes              | 15.11              | 14.47          | 15.76              | 15.26          |
| SUA                  | No               | 88.28              | 86.17          | 88.40              | 84.29          |
|                      | Yes              | 11.72              | 13.83          | 11.60              | 15.71          |
| ELL                  | No               | 90.73              | 90.46          | 91.72              | 91.30          |
|                      | Yes              | 9.27               | 9.54           | 8.28               | 8.70           |

**Table 6.2. ELA Grades 5 and 6 Demographic Statistics**

| Demographic Category |                  | Grade 5            |                | Grade 6            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 49.15              | 49.18          | 48.91              | 49.16          |
|                      | Male             | 50.85              | 50.82          | 51.09              | 50.84          |
| Ethnicity            | Asian            | 10.24              | 10.40          | 9.95               | 10.86          |
|                      | Black            | 19.36              | 19.04          | 19.71              | 19.13          |
|                      | Hispanic         | 26.57              | 27.85          | 26.50              | 26.72          |
|                      | American Indian  | 0.62               | 0.66           | 0.66               | 0.67           |
|                      | Multiracial      | 1.50               | 1.83           | 1.39               | 1.59           |
|                      | Pacific Islander | 0.25               | 0.28           | 0.28               | 0.27           |
|                      | White            | 41.46              | 39.94          | 41.50              | 40.76          |
| NRC                  | New York         | 38.65              | 41.58          | 37.67              | 39.94          |
|                      | Big 4 Cities     | 4.00               | 4.02           | 3.89               | 4.04           |
|                      | Urban/Suburban   | 7.24               | 7.58           | 7.02               | 6.89           |
|                      | Rural            | 4.78               | 5.28           | 4.73               | 5.17           |
|                      | Average Needs    | 22.50              | 22.28          | 21.66              | 21.56          |
|                      | Low Needs        | 11.27              | 10.47          | 10.82              | 10.77          |
|                      | Charter          | 5.35               | 5.21           | 5.35               | 5.81           |
|                      | Non-Public       | 6.12               | 3.59           | 8.76               | 5.81           |
| SWD                  | No               | 83.31              | 83.40          | 83.93              | 83.82          |
|                      | Yes              | 16.69              | 16.60          | 16.07              | 16.18          |
| SUA                  | No               | 87.66              | 82.97          | 88.47              | 83.56          |
|                      | Yes              | 12.34              | 17.03          | 11.53              | 16.44          |
| ELL                  | No               | 92.19              | 92.53          | 93.03              | 92.57          |
|                      | Yes              | 7.81               | 7.47           | 6.97               | 7.43           |

**Table 6.3. ELA Grades 7 and 8 Demographic Statistics**

| Demographic Category |                  | Grade 7            |                | Grade 8            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 48.78              | 48.74          | 48.49              | 48.76          |
|                      | Male             | 51.22              | 51.26          | 51.51              | 51.24          |
| Ethnicity            | Asian            | 9.94               | 10.92          | 10.11              | 11.16          |
|                      | Black            | 20.57              | 19.86          | 21.06              | 20.96          |
|                      | Hispanic         | 26.49              | 27.00          | 26.34              | 27.33          |
|                      | American Indian  | 0.61               | 0.74           | 0.59               | 0.64           |
|                      | Multiracial      | 1.13               | 1.37           | 1.03               | 1.11           |
|                      | Pacific Islander | 0.25               | 0.28           | 0.25               | 0.26           |
|                      | White            | 41.02              | 39.83          | 40.61              | 38.53          |
| NRC                  | New York         | 39.69              | 42.90          | 40.42              | 44.40          |
|                      | Big 4 Cities     | 3.92               | 3.96           | 3.93               | 3.99           |
|                      | Urban/Suburban   | 7.03               | 6.89           | 6.91               | 6.40           |
|                      | Rural            | 4.86               | 5.22           | 4.90               | 5.09           |
|                      | Average Needs    | 21.25              | 21.09          | 20.44              | 19.64          |
|                      | Low Needs        | 11.86              | 11.09          | 11.26              | 10.44          |
|                      | Charter          | 4.89               | 5.50           | 3.71               | 4.75           |
|                      | Non-Public       | 6.43               | 3.36           | 8.31               | 5.30           |
| SWD                  | No               | 83.67              | 83.79          | 84.17              | 84.36          |
|                      | Yes              | 16.33              | 16.21          | 15.83              | 15.64          |
| SUA                  | No               | 88.91              | 83.88          | 89.28              | 84.29          |
|                      | Yes              | 11.09              | 16.12          | 10.72              | 15.71          |
| ELL                  | No               | 93.17              | 93.05          | 93.75              | 92.97          |
|                      | Yes              | 6.83               | 6.95           | 6.25               | 7.03           |

**Table 6.4. Mathematics Grades 3 and 4 Demographic Statistics**

| Demographic Category |                  | Grade 3            |                | Grade 4            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 48.93              | 49.43          | 49.02              | 49.26          |
|                      | Male             | 51.07              | 50.57          | 50.98              | 50.74          |
| Ethnicity            | Asian            | 10.17              | 10.44          | 10.09              | 10.40          |
|                      | Black            | 18.91              | 18.05          | 19.18              | 18.69          |
|                      | Hispanic         | 28.61              | 28.62          | 27.90              | 28.34          |
|                      | American Indian  | 0.66               | 0.70           | 0.61               | 0.64           |
|                      | Multiracial      | 2.14               | 2.43           | 1.73               | 2.12           |
|                      | Pacific Islander | 0.36               | 0.32           | 0.30               | 0.38           |
|                      | White            | 39.15              | 39.45          | 40.18              | 39.45          |
| NRC                  | New York         | 40.45              | 40.19          | 40.08              | 40.25          |
|                      | Big 4 Cities     | 4.29               | 4.36           | 3.97               | 4.20           |
|                      | Urban/Suburban   | 7.78               | 7.70           | 7.19               | 7.41           |
|                      | Rural            | 4.88               | 5.27           | 4.51               | 5.12           |
|                      | Average Needs    | 21.56              | 21.84          | 20.90              | 21.28          |
|                      | Low Needs        | 9.92               | 9.75           | 10.08              | 9.77           |
|                      | Charter          | 5.21               | 5.35           | 4.53               | 4.85           |
|                      | Non-Public       | 5.81               | 5.54           | 8.65               | 7.12           |
| SWD                  | No               | 85.02              | 85.50          | 84.34              | 84.75          |
|                      | Yes              | 14.98              | 14.50          | 15.66              | 15.25          |
| SUA                  | No               | 92.44              | 86.21          | 91.80              | 84.49          |
|                      | Yes              | 7.56               | 13.79          | 8.20               | 15.51          |
| ELL                  | No               | 88.13              | 89.61          | 88.67              | 90.64          |
|                      | Yes              | 11.87              | 10.39          | 11.33              | 9.36           |

**Table 6.5. Mathematics Grades 5 and 6 Demographic Statistics**

| Demographic Category |                  | Grade 5            |                | Grade 6            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 48.96              | 48.84          | 48.80              | 49.03          |
|                      | Male             | 51.04              | 51.16          | 51.20              | 50.97          |
| Ethnicity            | Asian            | 10.66              | 10.67          | 10.44              | 11.06          |
|                      | Black            | 19.36              | 19.30          | 19.78              | 19.23          |
|                      | Hispanic         | 27.19              | 28.56          | 27.20              | 27.16          |
|                      | American Indian  | 0.59               | 0.68           | 0.65               | 0.67           |
|                      | Multiracial      | 1.44               | 1.86           | 1.32               | 1.56           |
|                      | Pacific Islander | 0.26               | 0.30           | 0.29               | 0.28           |
|                      | White            | 40.50              | 38.64          | 40.32              | 40.04          |
| NRC                  | New York         | 40.01              | 41.87          | 39.48              | 39.91          |
|                      | Big 4 Cities     | 4.01               | 4.10           | 3.85               | 3.99           |
|                      | Urban/Suburban   | 7.05               | 7.33           | 6.72               | 6.46           |
|                      | Rural            | 4.52               | 5.02           | 4.47               | 4.81           |
|                      | Average Needs    | 21.63              | 21.45          | 20.45              | 20.48          |
|                      | Low Needs        | 11.05              | 10.24          | 10.51              | 10.38          |
|                      | Charter          | 5.45               | 5.55           | 5.49               | 6.09           |
|                      | Non-Public       | 6.20               | 4.43           | 8.93               | 7.88           |
| SWD                  | No               | 83.62              | 83.45          | 84.32              | 84.25          |
|                      | Yes              | 16.38              | 16.55          | 15.68              | 15.75          |
| SUA                  | No               | 88.15              | 83.17          | 88.46              | 84.25          |
|                      | Yes              | 11.85              | 16.83          | 11.54              | 15.75          |
| ELL                  | No               | 90.93              | 91.78          | 91.72              | 91.71          |
|                      | Yes              | 9.07               | 8.22           | 8.28               | 8.29           |

**Table 6.6. Mathematics Grades 7 and 8 Demographic Statistics**

| Demographic Category |                  | Grade 7            |                | Grade 8            |                |
|----------------------|------------------|--------------------|----------------|--------------------|----------------|
|                      |                  | 2015<br>Population | 2016<br>Sample | 2015<br>Population | 2016<br>Sample |
| Gender               | Female           | 48.67              | 48.66          | 47.73              | 48.00          |
|                      | Male             | 51.33              | 51.34          | 52.27              | 52.00          |
| Ethnicity            | Asian            | 10.49              | 11.28          | 8.93               | 9.68           |
|                      | Black            | 20.63              | 20.16          | 23.67              | 22.97          |
|                      | Hispanic         | 27.50              | 27.92          | 30.18              | 30.86          |
|                      | American Indian  | 0.58               | 0.74           | 0.61               | 0.66           |
|                      | Multiracial      | 1.05               | 1.32           | 0.95               | 1.03           |
|                      | Pacific Islander | 0.25               | 0.29           | 0.26               | 0.27           |
|                      | White            | 39.50              | 38.28          | 35.40              | 34.53          |
| NRC                  | New York         | 42.34              | 43.93          | 45.49              | 46.88          |
|                      | Big 4 Cities     | 3.81               | 3.96           | 4.45               | 4.45           |
|                      | Urban/Suburban   | 6.62               | 6.43           | 6.77               | 6.49           |
|                      | Rural            | 4.43               | 4.85           | 4.67               | 4.79           |
|                      | Average Needs    | 19.57              | 19.69          | 16.22              | 15.72          |
|                      | Low Needs        | 11.19              | 10.63          | 7.69               | 7.14           |
|                      | Charter          | 5.12               | 5.75           | 4.20               | 5.14           |
|                      | Non-Public       | 6.84               | 4.76           | 10.41              | 9.39           |
| SWD                  | No               | 84.12              | 84.09          | 81.80              | 82.06          |
|                      | Yes              | 15.88              | 15.91          | 18.20              | 17.94          |
| SUA                  | No               | 89.01              | 84.45          | 88.67              | 82.32          |
|                      | Yes              | 10.99              | 15.55          | 11.33              | 17.68          |
| ELL                  | No               | 91.53              | 92.34          | 90.58              | 90.06          |
|                      | Yes              | 8.47               | 7.66           | 9.42               | 9.94           |

### 6.2.1. Calibration Process

The item parameters were estimated using Scientific Software International (SSI) Inc.'s IRTPRO Version 2.1 (Cai, Thissen, and du Toit, 2011) package. MC and CR items were calibrated simultaneously, using marginal maximum likelihood procedures.

The calibration of NYSTP 2016 Grades 3–8 Common Core ELA and Mathematics Tests did not exhibit any test-level issues. The estimated parameters were on the original theta scale, and all of the items were well within the prescribed parameter ranges. For both the Grades 3–8 Common Core ELA and Mathematics Tests, all calibration estimation results were reasonable. Tables 6.7 and 6.8 present the summaries of the calibration results for ELA and Mathematics, respectively. Additional details, including individual item parameter estimates, may be found in Appendix O, in Tables O13–O24. The parameter estimates are expressed on the theta metric and are defined below:

- MC items:
  - $a$ -parameter is a discrimination parameter
  - $b$ -parameter is a difficulty parameter
  - $c$ -parameter is a guessing parameter
- CR items:
  - $\alpha$  is a discrimination parameter
  - $step$  is a difficulty parameter for category  $m_j$

As described in Section 6: IRT Calibration and Linking, above in Section 6.1. IRT Models and Rationale for Use,  $m_j$  denotes the number of score levels for the  $j$ th item, and, typically, the highest score level is assigned  $(m_j - 1)$  score points. For the 2PPC model there are  $m_j - 1$  independent steps and one alpha, for a total of  $m_j$  independent parameters estimated for each item, while there is one  $a$ -parameter and one  $b$ -parameter per item in the 3PL model.

**Table 6.7. ELA Calibration Results**

| Grade | Item-level             |                                  |       | Student-level |             |      |
|-------|------------------------|----------------------------------|-------|---------------|-------------|------|
|       | Largest<br>a-Parameter | Range of b- /<br>Step Parameters |       | N-Count       | Theta Est.* |      |
|       |                        |                                  |       |               | Mean        | SD   |
| 3     | 1.304                  | -1.844                           | 1.058 | 173,540       | 0.01        | 0.94 |
| 4     | 1.031                  | -1.120                           | 1.320 | 171,061       | 0.00        | 0.94 |
| 5     | 1.304                  | -2.390                           | 1.662 | 160,807       | 0.00        | 0.94 |
| 6     | 1.199                  | -1.323                           | 2.746 | 158,161       | 0.00        | 0.94 |
| 7     | 1.362                  | -2.054                           | 1.758 | 148,857       | 0.00        | 0.94 |
| 8     | 1.328                  | -2.447                           | 1.005 | 143,555       | -0.01       | 0.94 |

\*Maximum *a posteriori* (MAP) theta estimates.

**Table 6.8. Mathematics Calibration Results**

| Grade | Item-level             |                                  |       | Student-level |             |      |
|-------|------------------------|----------------------------------|-------|---------------|-------------|------|
|       | Largest<br>a-Parameter | Range of b- /<br>Step Parameters |       | N-Count       | Theta Est.* |      |
|       |                        |                                  |       |               | Mean        | SD   |
| 3     | 1.676                  | -2.820                           | 1.363 | 178,870       | 0.01        | 0.93 |
| 4     | 1.725                  | -1.630                           | 1.066 | 174,321       | 0.01        | 0.92 |
| 5     | 2.636                  | -4.310                           | 1.354 | 162,795       | 0.01        | 0.93 |
| 6     | 2.053                  | -1.345                           | 1.898 | 160,851       | 0.03        | 0.92 |
| 7     | 2.190                  | -1.494                           | 1.240 | 146,870       | 0.04        | 0.91 |
| 8     | 1.867                  | -0.958                           | 1.554 | 114,953       | 0.05        | 0.89 |

\*Maximum *a posteriori* (MAP) theta estimates.

### 6.3. Item-Model Fit

Item fit statistics provide evidence of the appropriateness of using an item in the 3PL or 2PPC model. The  $Q_I$  procedure described by Yen (1981) was used to measure fit to the three-parameter



model. Students are rank-ordered on the basis of  $\hat{\theta}$  values and sorted into ten cells with 10% of the sample in each cell. For each item, the number of students in cell  $k$  who answered item  $i$ ,  $N_{ik}$ , and the number of students in that cell who answered item  $i$  correctly,  $R_{ik}$ , were determined. The observed proportion in cell  $k$  passing item  $i$ ,  $O_{ik}$ , is  $R_{ik}/N_{ik}$ . The fit index for item  $i$  is:

$$Q_i = \sum_{k=1}^{10} \frac{N_{ik} (O_{ik} - E_{ik})^2}{E_{ik} (1 - E_{ik})}$$

with:

$$E_{ik} = \frac{1}{N_{ik}} \sum_{j \in \text{cell } k}^{N_{ik}} P_i(\hat{\theta}_j)$$

A modification of this procedure was used to measure fit to the 2PPC model. For the 2PPC model,  $Q_{ij}$  was assumed to have an approximate chi-square distribution with the following degrees of freedom ( $df$ ):

$$df = I(m_j - 1) - m_j,$$

where  $I$  is the total number of cells (usually 10) and  $m_j$  is the possible number of score levels for item  $j$ .

To adjust for differences in degrees of freedom among items,  $Q_i$  was transformed to  $Z_{Q_i}$  where:

$$Z_{Q_i} = (Q_i - df) / (2df)^{1/2}$$

The value of  $Z$  increases with sample size, when all else is equal. To use this standardized statistic to flag items for potential poor fit, it has been a common practice to vary the critical value for  $Z$  as a function of sample size. For the tests that have large calibration sample sizes, the criterion  $Z_{Q_i} \text{Crit}$  was used to flag items and was calculated using the expression

$$Z_{Q_i} \text{Crit} = \left( \frac{N}{1500} \right) * 4,$$

where  $N$  is the calibration sample size.

To compute the  $Q_i$  and related statistics, a stratified sampling procedure was implemented in a way that a representative sample with the size of approximately 70,000 students was drawn at each grade level. Items were considered to have poor fit if the value of the obtained  $Z_{Q_i}$  was greater than the value of  $Z_{Q_i}$  critical. If the obtained  $Z_{Q_i}$  was less than  $Z_{Q_i}$  critical, the items were rated as having acceptable fit. The fact that the majority of the items in the NYSTP 2016 Grades 3–8 Common Core ELA and Mathematics Tests demonstrated good model fit further supports the use of the chosen models. Item fit statistics are presented in Appendix O, in Tables O1–O12.

#### 6.4. Local Independence

In using IRT models, one of the assumptions made is that the items are locally independent; that a student's response to one item is not dependent upon his or her response to another item. In other words, when a student's proficiency is accounted for, his or her response to each item is statistically independent.

One way to measure the statistical independence of items within a test is via the  $Q_3$  statistic (Yen, 1984). This statistic was obtained by correlating differences between students' observed and expected responses for pairs of items after taking into account overall test performance. The  $Q_3$  statistic for binary items was computed as

$$d_{ij} \equiv u_{ij} - P_j(\hat{\theta}_i)$$

where  $\hat{\theta}_i$  is the estimated trait value (i.e., proficiency) for the  $i$ th examinee;  $u_{ij}$  is the observed probability for the  $i$ th examinee to get the  $j$ th item correct and  $P_j$  is estimated probability for the  $i$ th examinee to get the  $j$ th item correct, and

$$Q_{3,ij} = r(d_j, d_{j'})$$

The generalization to items with multiple response categories uses

$$d_{ij} \equiv x_{ij} - E_{ij},$$

where

$$E_{ij} \equiv E(x|\hat{\theta}_i) = \sum_{k=1}^{m_j} kP_{jk}(\hat{\theta}_i)$$

If a substantial number of items in the test demonstrate local dependence, these items may need to be calibrated separately. All pairs of items with  $Q_3$  values greater than .20 were classified as significant for local dependency. The maximum value for this index is 1.00. When item pairs are flagged by  $Q_3$ , the content of the flagged items is examined to identify possible sources of the local dependence. The primary concern about locally dependent items is that they contribute less psychometric information about examinee proficiency than do locally independent items, and therefore inflate score reliability estimates.

The  $Q_3$  statistics were examined for all unique pairs of ELA and mathematics items. Items that were found to be significant in local dependency vary, depending on the subject and grade: one pair of items was found in ELA Grade 8. When reviewing the results for Mathematics, one pair of items each exceeded a correlation of .20 in Mathematics Grades 4, 7, and 8. The magnitudes of these statistics were not sufficient to warrant further concern or action (with the  $Q_3$  values being .27 for the ELA test and ranging from .23 to .28 for the Mathematics tests).

## 6.5. Linking and Scaling

With the new assessments being implemented in 2013, the scale was established after the data were collected. The purpose of linking was to place the 2016 item parameters and proficiency estimates on the same scale as those in 2015. The following steps constitute the linking process for each subject and grade:

1. Operational items as well as non-scored (i.e., external) anchor items were calibrated in IRTPRO.
2. The 2016 item parameter estimates for all anchor items—both scored and non-scored—enabled the establishment of the linking relationship via a test characteristic curve (TCC) method (Stocking and Lord, 1983; implemented in STUIRT, Kim, & Kolen, 2004) to the 2015 theta scale, using the established 2015 item parameter estimates for those same items. Tables 6.9 and 6.10 present the resulting linking coefficients. The following parameters were linked using the formulas below:

$$a_i^E = a_i^C / M_1^E,$$

$$b_i^E = M_1^E \cdot b_i^C + M_2^E, \text{ and}$$

$$d_{ij}^E = d_{ij}^C + \left[ (a_i^C / M_1^E) \right] \cdot M_2^E,$$

where

$M_1^E$  is defined as the multiplicative adjustment for linking and  $M_2^E$  is the additive adjustment for linking. The superscript “E” denotes linked item parameter estimates, while the superscript “C” denotes calibrated item parameter estimates.

**Table 6.9. ELA Linking Coefficients**

| Grade | $M_1^E$ | $M_2^E$ |
|-------|---------|---------|
| 3     | 1.022   | 0.265   |
| 4     | 0.945   | 0.197   |
| 5     | 1.120   | -0.082  |
| 6     | 1.015   | -0.004  |
| 7     | 0.991   | 0.071   |
| 8     | 0.999   | 0.131   |

**Table 6.10. Mathematics Linking Coefficients**

| Grade | $M_1^E$ | $M_2^E$ |
|-------|---------|---------|
| 3     | 1.141   | 0.197   |
| 4     | 1.175   | 0.156   |
| 5     | 1.148   | 0.202   |
| 6     | 1.179   | 0.170   |
| 7     | 1.175   | 0.169   |
| 8     | 1.188   | -0.205  |

3. A raw-score-to-theta conversion chart was produced using the test characteristic curve (TCC) method (Stocking and Lord, 1983; see Section 6.8. Scoring Procedure for more details) and implemented in POLYEQUATE (Kolen & Cui, 2004). The theta estimates associated with the TCC method ( $\hat{\theta}_{TCC}$ ) must be linked back to the underlying theta scale established in the prior year (Spring 2015), and are computed as follows:

$$\theta^E = (M_1^E \cdot \hat{\theta}_{TCC}) + M_2^E$$

4. The TCC method does not produce theta estimates for raw scores below chance level or above the perfect score (highest obtainable raw score). In addition, for the scores at the low and high ends of the scale, some raw scores tended to have large theta estimates (for example, -7.999). Typically, the first obtainable theta value on a test corresponds to a very extreme theta value. The following adjustment/interpolation was conducted:

For any linked theta estimates ( $\theta^E$ ) that are outside of the range of -2.5 to 3, at the lower end of the scale, 0.25 was subtracted from the preceding theta value that is within the range; at the higher end of the scale, 0.25 was added to the previous theta value that is within the range, thus resulting in an adjusted theta estimate ( $\theta^A$ ) for those extremes. See the table below for an example at the lower end of the scale. Such an adjustment helps contain the theta scale within a reasonable range, and is standard practice in testing.

| Raw Score | $\theta^E$ | $\theta^A$ |
|-----------|------------|------------|
| 6         | -5.30263   | -3.37458   |
| 7         | -3.66491   | -3.12458   |
| 8         | -3.03055   | -2.87458   |
| 9         | -2.76782   | -2.62458   |
| 10        | -2.37458   | -2.37458   |

5. Once theta values were either estimated or interpolated for all raw scores, the raw-score-to-theta relationship was applied to each student, yielding a theta estimate corresponding to his or her raw score.
6. The adjusted theta estimates (presented in Tables 6.11 and 6.12) were then scaled using the established scaling coefficients from the prior year (Spring 2015) according to the following formula:

$$ScaleScore = (M_1^S \cdot \theta^A) + M_2^S,$$

where

$M_1^S$  is defined as the multiplicative scaling coefficient, and  $M_2^S$  is the additive scaling coefficient.  $M_1^S$  and  $M_2^S$  are applied to a true score (i.e., the linked theta estimate) in order to obtain a scale score.

**Table 6.11. ELA Scaling Coefficients**

| Grade | $M_1^S$ | $M_2^S$  |
|-------|---------|----------|
| 3     | 31.8145 | 301.4946 |
| 4     | 32.0356 | 300.7619 |
| 5     | 32.0160 | 300.9540 |
| 6     | 32.2585 | 300.6730 |
| 7     | 31.9257 | 300.8012 |
| 8     | 31.6273 | 300.9795 |

**Table 6.12. Mathematics Scaling Coefficients**

| Grade | $M_1^S$ | $M_2^S$  |
|-------|---------|----------|
| 3     | 32.2491 | 299.8560 |
| 4     | 32.6982 | 300.1764 |
| 5     | 32.2199 | 300.6932 |
| 6     | 32.4213 | 300.3769 |
| 7     | 31.2289 | 301.1438 |
| 8     | 31.8685 | 301.1430 |

7. Scale scores range, approximately, from 100 to 400 across grades. The lowest and highest observed scale score (LOSS and HOSS, respectively) may vary by grade.
8. A series of anchor set stability checks were performed before finalizing the anchor set for each subject and grade; see Section 6.6. Anchor Set Evaluation, which follows this one.
9. For conditional standard error of measurement (CSEM), the scale scores (both estimated and interpolated) were used to compute the information function and CSEM.

Throughout this process, NYSED psychometricians have reviewed, and a senior scientist from HumRRO has independently verified, the results generated by Questar psychometricians.

## 6.6. Anchor Set Evaluation

In order to determine if each item from the anchor set performs similarly to when it was administered in the prior year, comparisons of individual item characteristic curves (ICCs) and item parameter estimates from the previous and current administrations were made. Initial

comparisons included a graphical inspection of the linearity of relationships between linked item parameter estimates from the 2015 and 2016 administrations. These revealed approximately linear relationships as well as similarities in item functions, and therefore provided support for the selected linking method used herein. Additional analyses of the correlations between linked item parameter estimates also provided evidence of strong linear relationships.

A formal process for validating the anchor set by using an objective criterion was used to determine if any items ought to be considered for removal from the anchor set. The linked item parameter estimates were used to calculate a weighted, squared deviation of the current ICC from the previous ICC, across the range of ability (i.e., theta, or  $\theta$ ) and under a hypothetical normal distribution for  $\theta$ . For a given item  $i$ , that quantity, called “d squared,” is given by

$$d_i^2 = \sum_k \{ [\text{Pr}_{i,16}(\theta_k) - \text{Pr}_{i,15}(\theta_k)]^2 \cdot g(\theta_k) \},$$

where  $i$  indexes anchor items;  $k$  indexes quadrature points for  $\theta$ ;  $\text{Pr}_{i,16}(\cdot)$  is the probability of a correct response to item  $i$  under the current calibration, while  $\text{Pr}_{i,15}(\cdot)$  is the same quantity under the previous calibration; and  $g(\theta_k)$  are weights for the quadrature points.

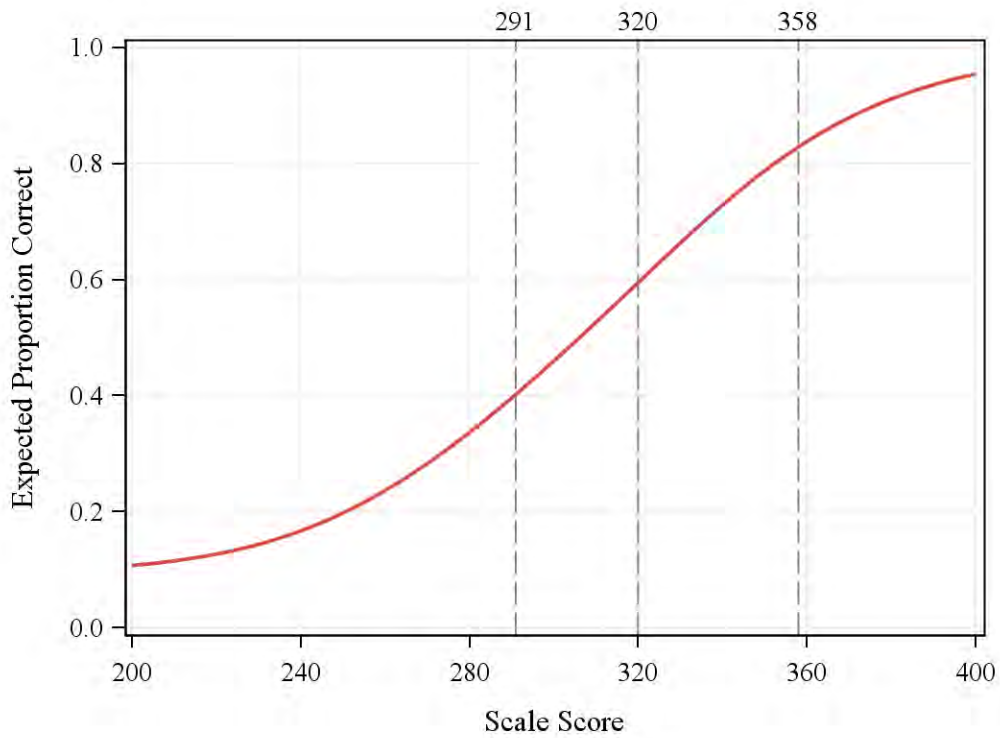
Historically, and as recently as the 2015 operational linking, a fixed criterion on this metric ( $d_i^2 \geq 0.05$ ) has been used for flagging items to be considered for removal from linking. The same approach and criterion were used for the linking of the 2016 operational forms to the 2015 scale score scale. This procedure minimizes the weighted squared differences between the two ICCs for each MC item: one based on 2015 item parameter estimates and the other on 2016 estimates. The differential item performance was evaluated by examining previous and current item parameters. The following steps were taken:

1. Before the iterative procedures start, the initial linking was performed, using all of the eligible anchor items as an anchor set, as described in Section 6.5: Linking and Scaling. The initial linking coefficients ( $M_1^E$  and  $M_2^E$ ) were obtained through the Stocking-Lord method.
2. The following process was repeated for at least five iterations or until the largest  $d_i^2 < 0.05$  is reached, whichever was greater:
  - a. For each anchor item,  $d_i^2$  was calculated as a weighted sum of the squared deviations between the ICCs based on old (2015) and new (2016) parameter estimates at each quadrature point and assuming a normal theta distribution.
  - b. The item having the largest  $d_i^2$  was identified and removed from the anchor set.
  - c. The linking procedures described in Section 6.5: Linking and Scaling were performed with the newly reduced anchor set.
  - d. New raw-score-to-scale-score tables were prepared as described in Section 6.8. Scoring Procedure.
3. Select the linking coefficients ( $M_1^E$  and  $M_2^E$ ) associated with the iteration selected in step 2 above.

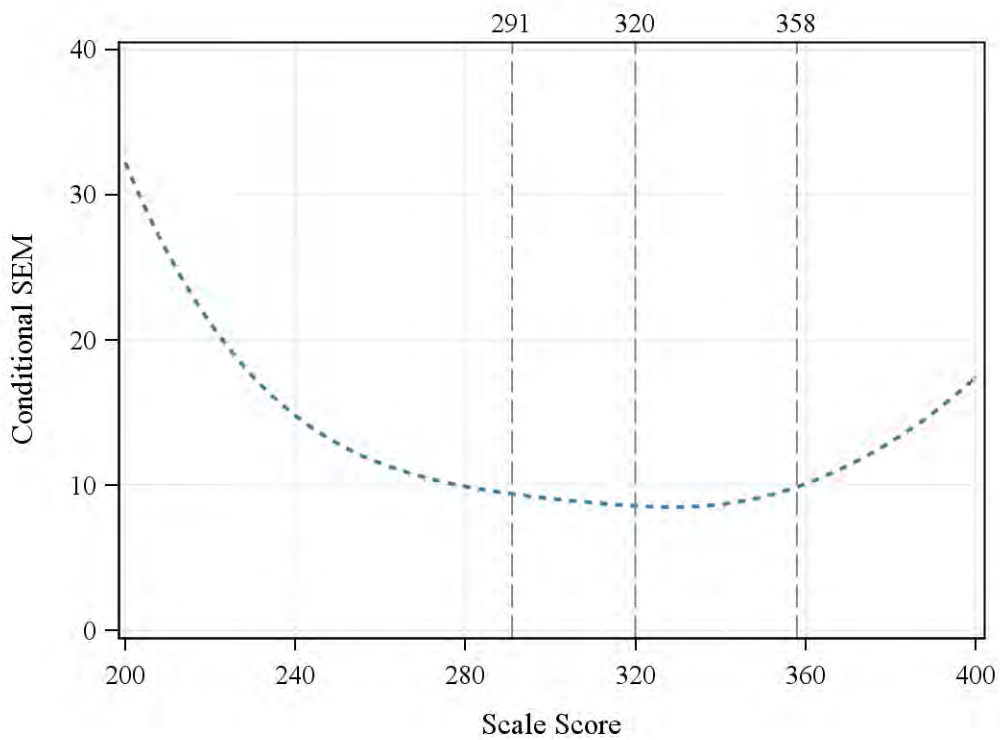
The items that are implicitly proposed for removal from the anchor set, based on the process described above, were summarized and evaluated. The only subject where items were proposed and ultimately approved for removal from the anchor set was mathematics, and one item each was removed from the anchor sets for Grades 5, 6, and 7.

### **6.7. Test Characteristic Curves**

Test Characteristic Curves (TCCs) provide an overview of the tests in the IRT scale score metric. The 2016 TCCs were generated using final item parameters for all reporting test items administered in Spring 2016. TCCs are the summation of all the item characteristic curves (ICCs) for items that contribute to the scale score. Conditional standard error of measurement (CSEM) curves graphically show the amount of measurement error at different performance levels. The TCCs and CSEM curves are presented in Figures 6.1 – 6.24.

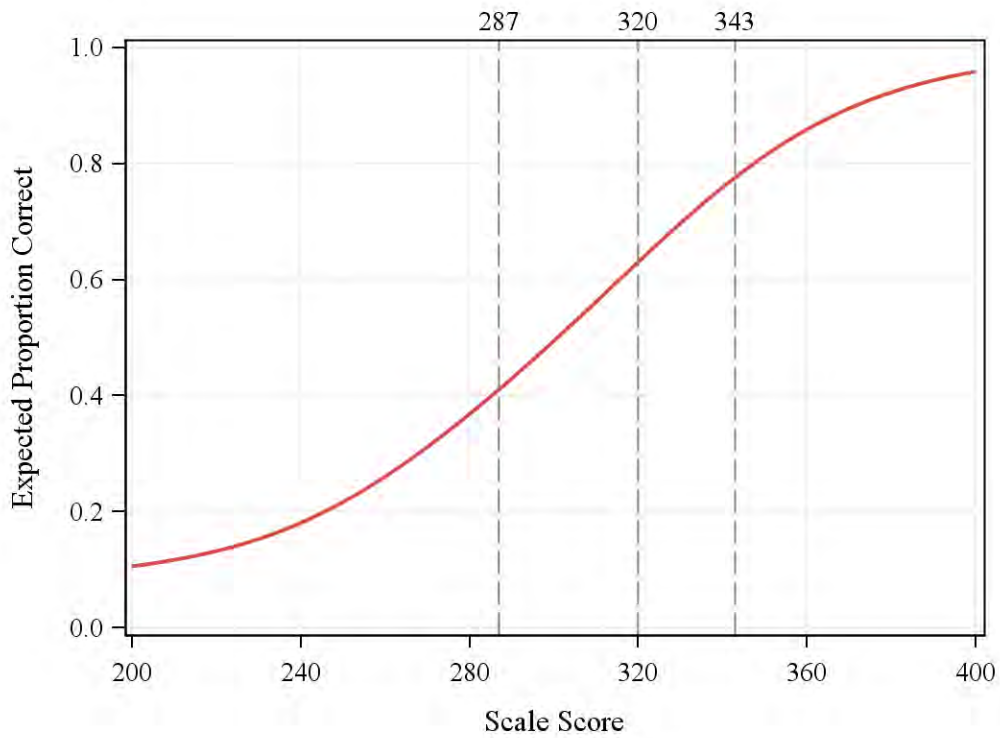


**Figure 6.1. ELA Grade 3 TCC**

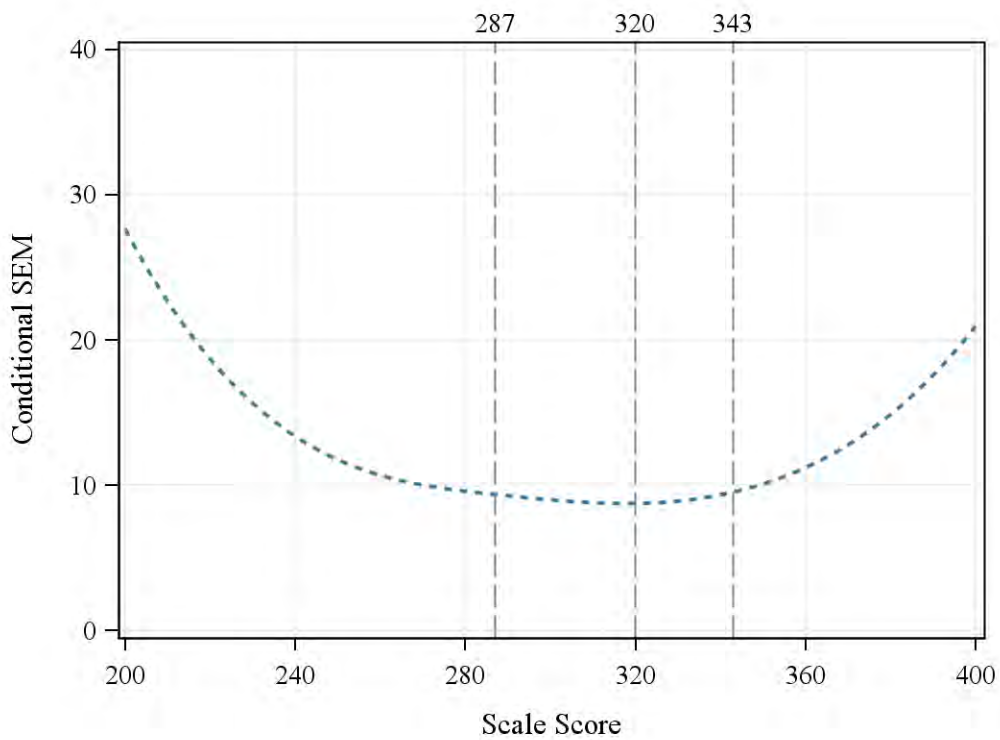


**Figure 6.2. ELA Grade 3 CSEM Curve**

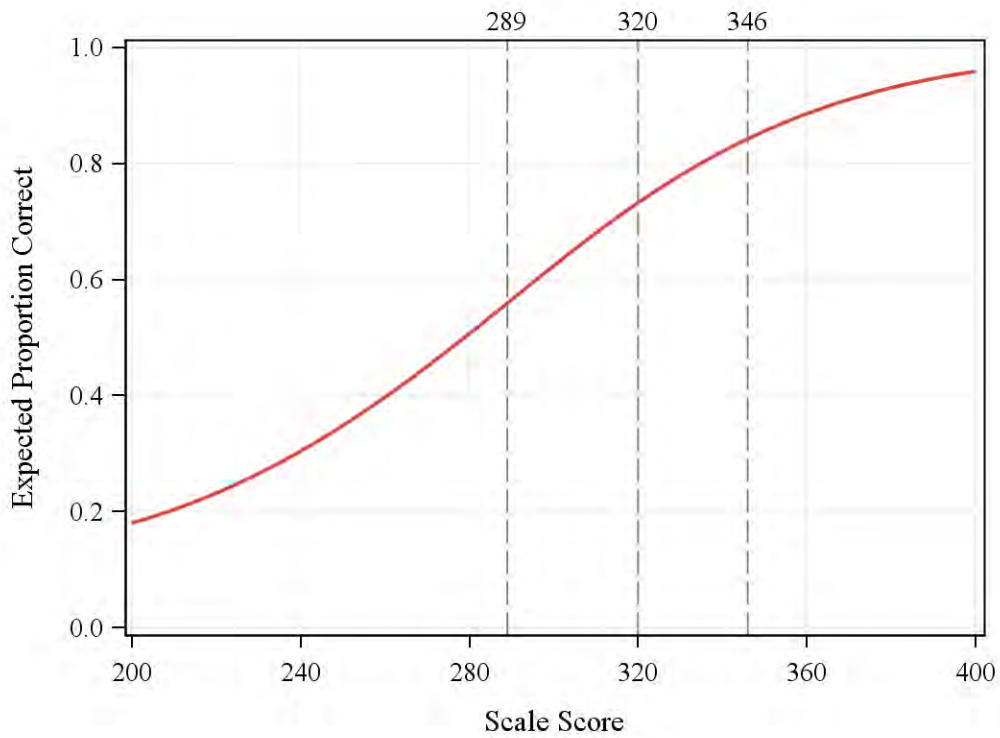




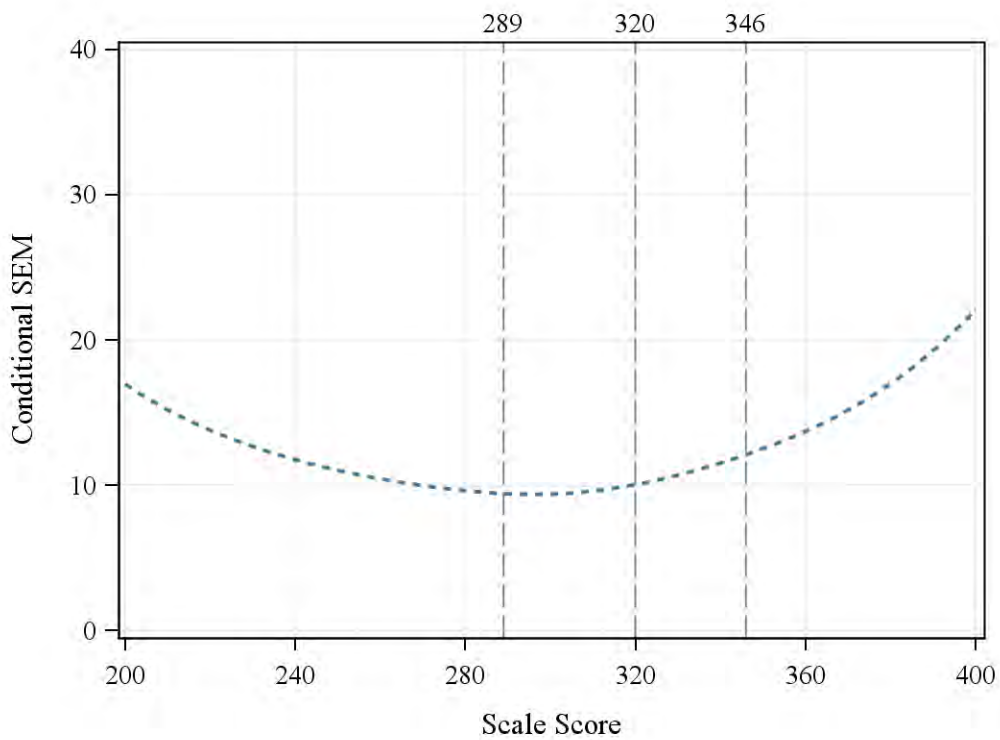
**Figure 6.3. ELA Grade 4 TCC**



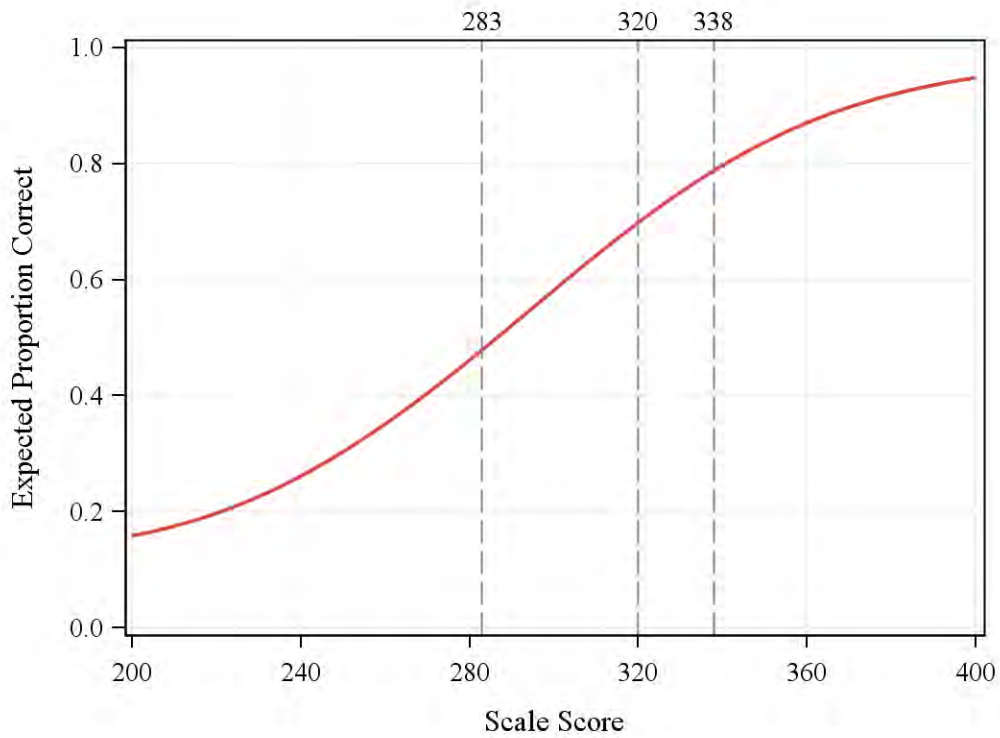
**Figure 6.4. ELA Grade 4 CSEM Curve**



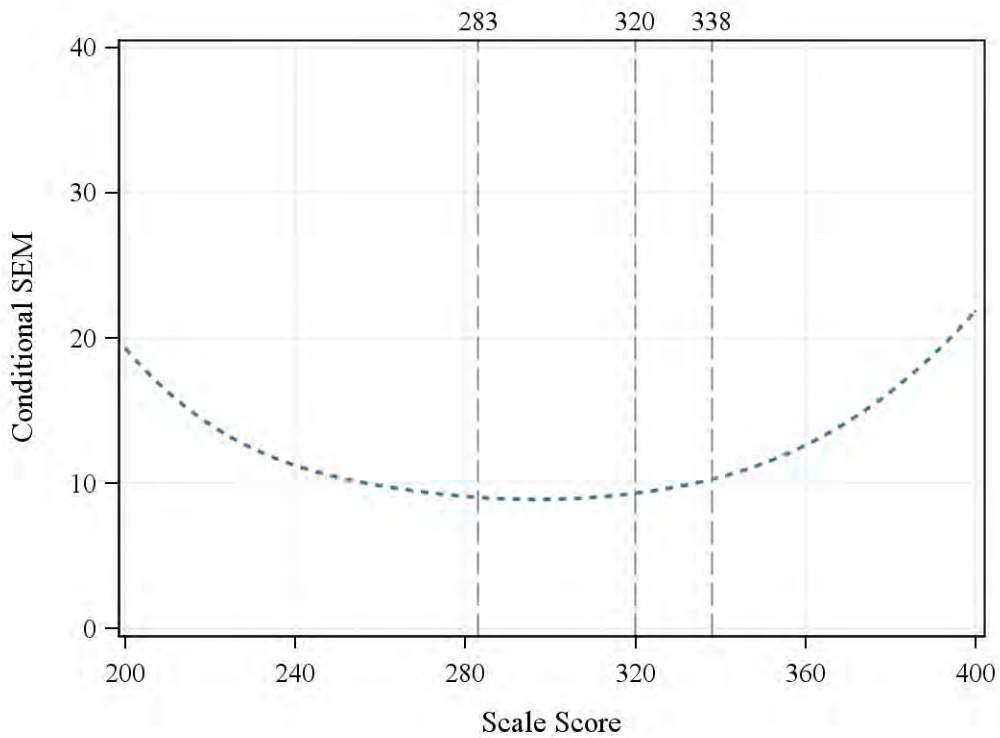
**Figure 6.5. ELA Grade 5 TCC**



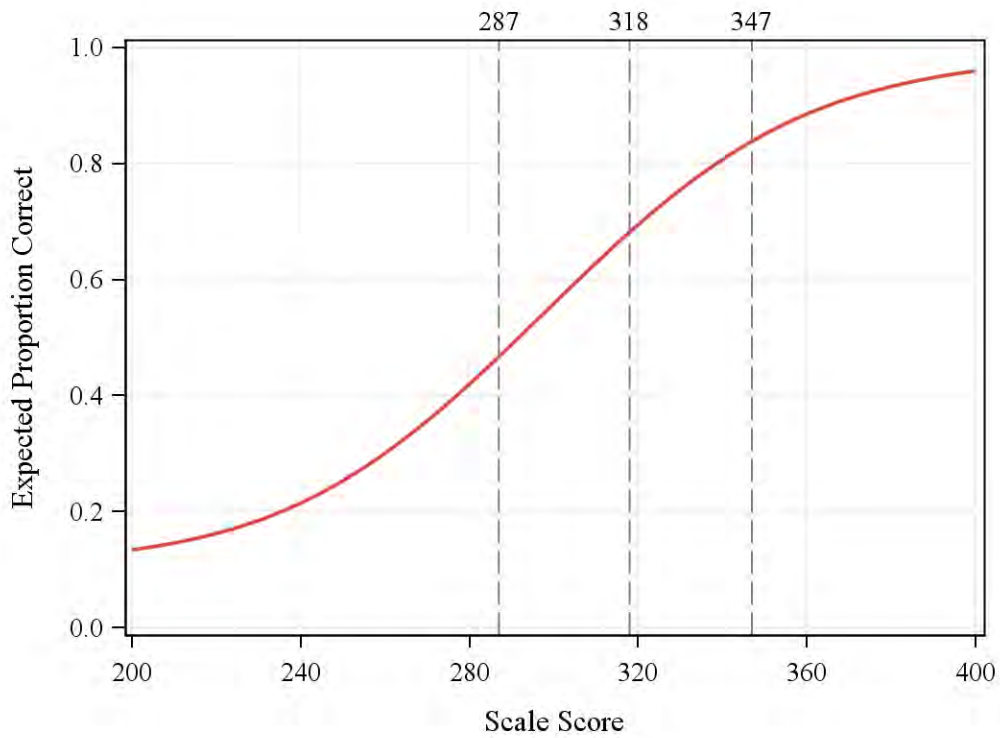
**Figure 6.6. ELA Grade 5 CSEM Curve**



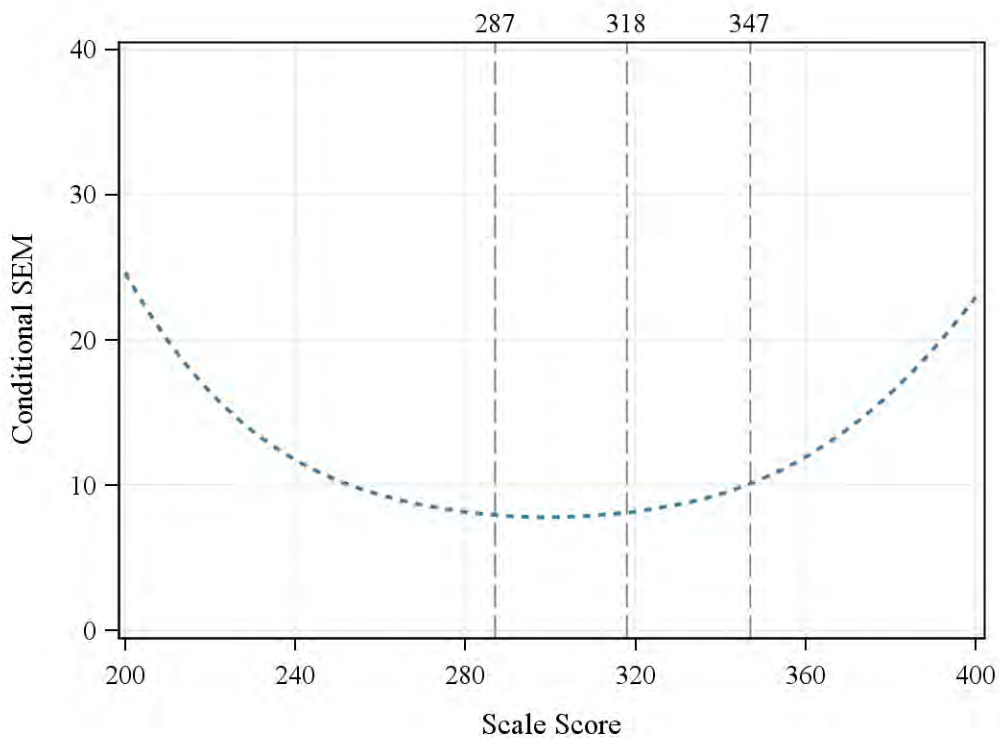
**Figure 6.7. ELA Grade 6 TCC**



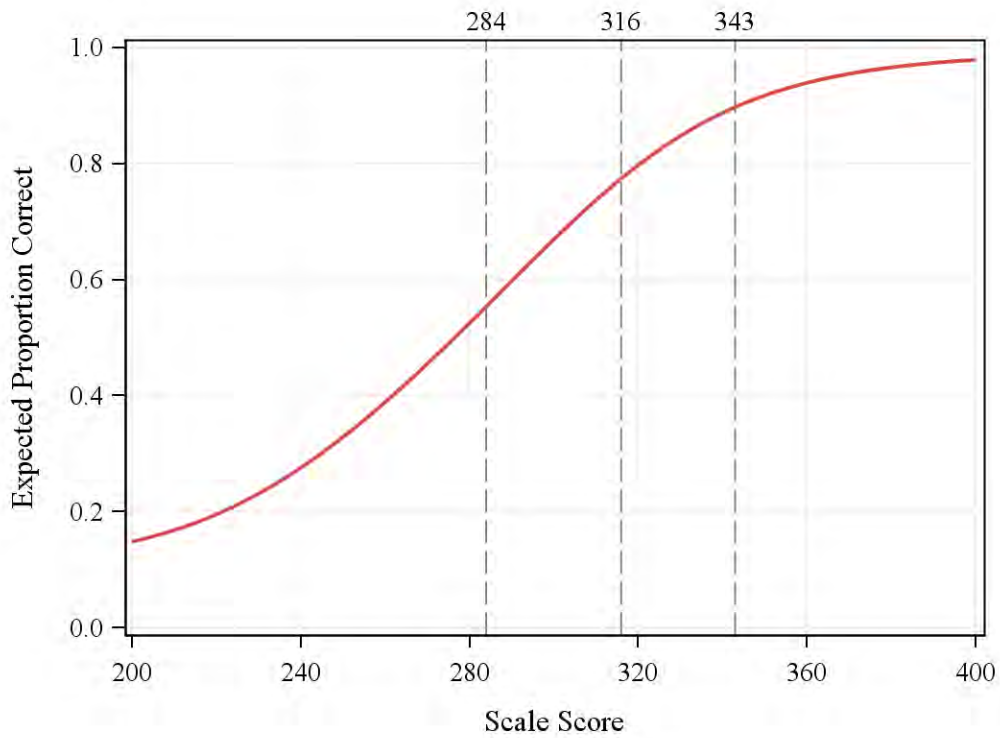
**Figure 6.8. ELA Grade 6 CSEM Curve**



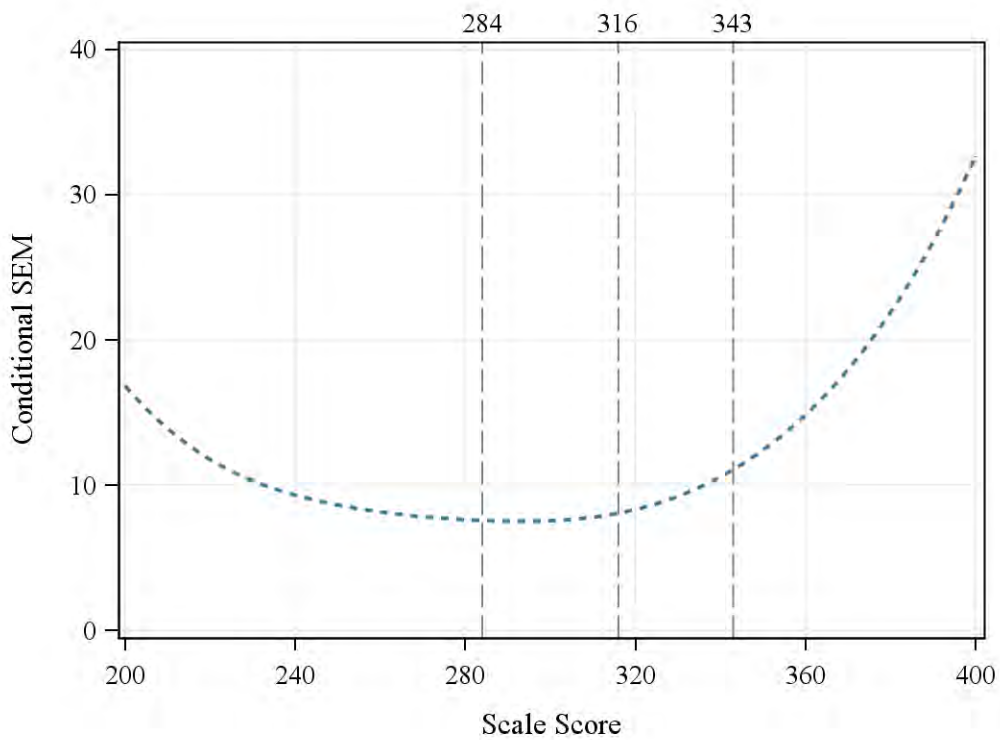
**Figure 6.9. ELA Grade 7 TCC**



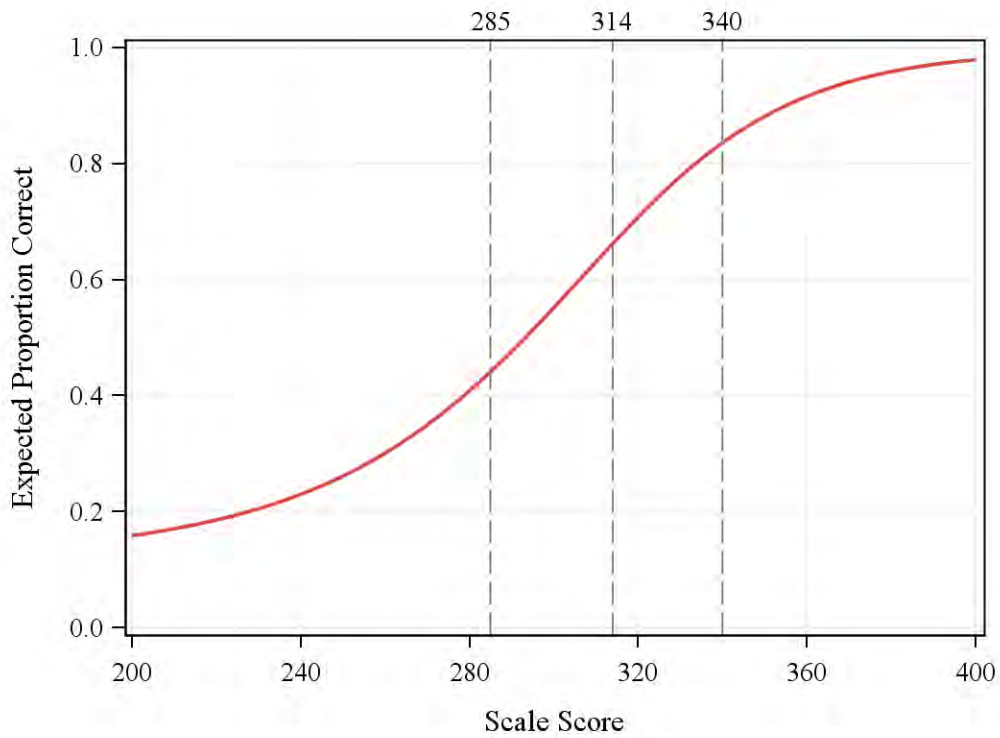
**Figure 6.10. ELA Grade 7 CSEM Curve**



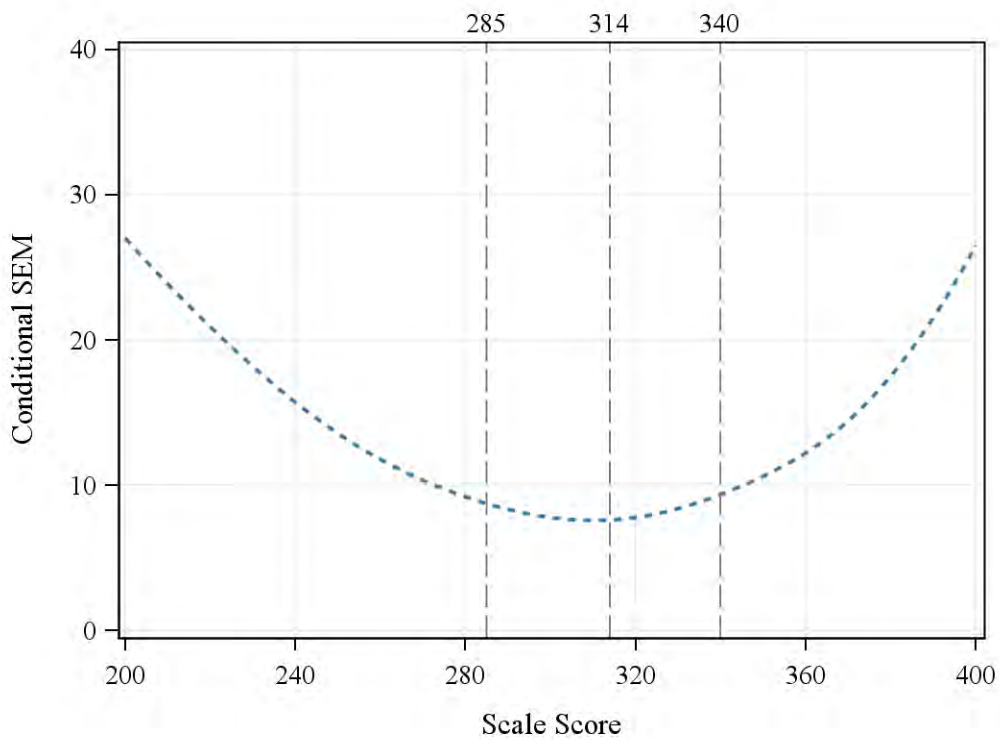
**Figure 6.11. ELA Grade 8 TCC**



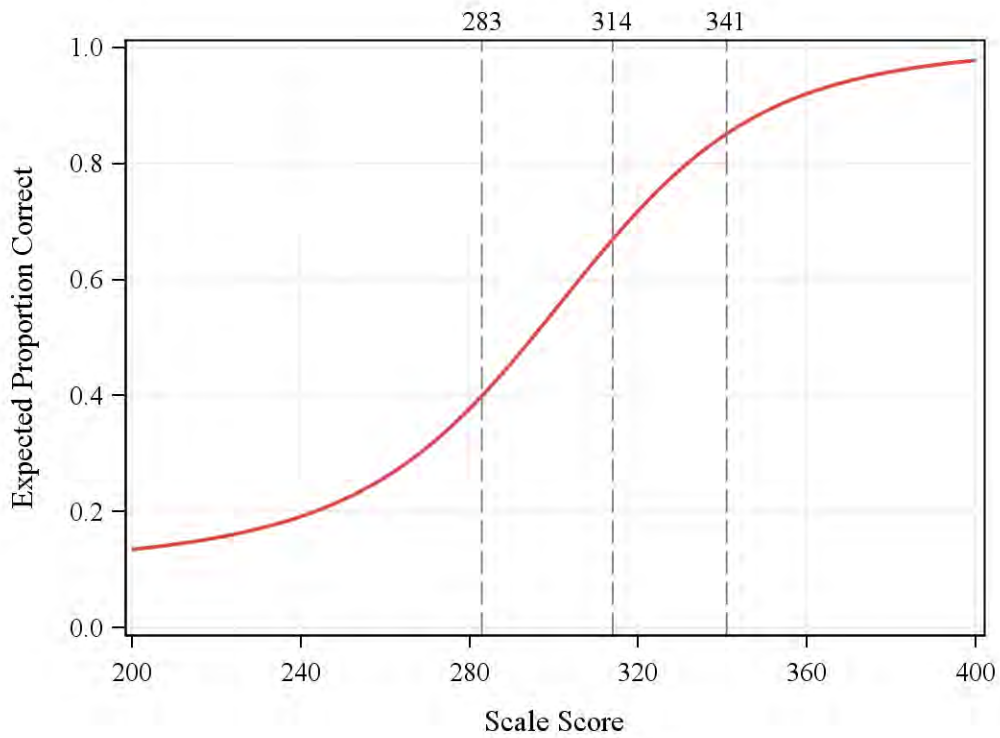
**Figure 6.12. ELA Grade 8 CSEM Curve**



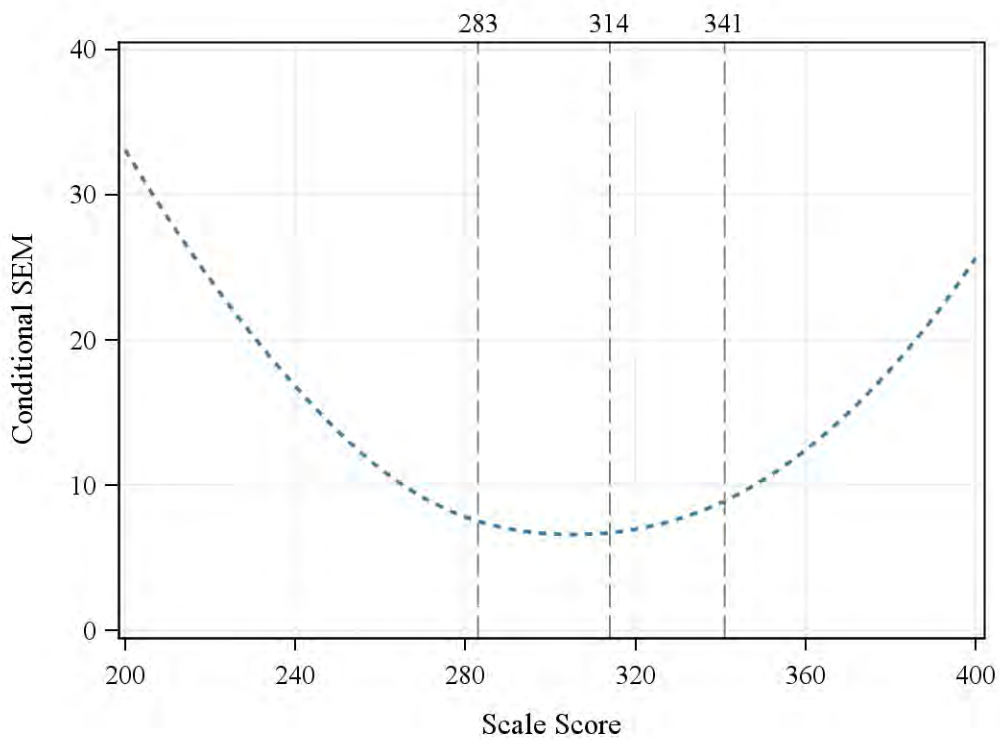
**Figure 6.13. Mathematics Grade 3 TCC**



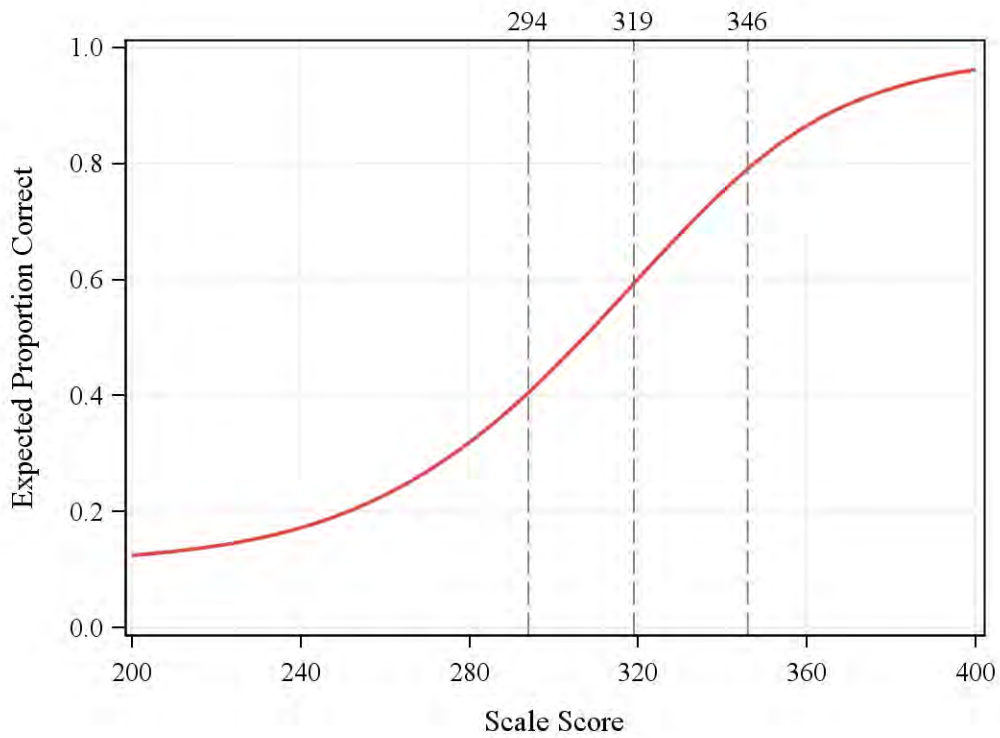
**Figure 6.14. Mathematics Grade 3 CSEM Curve**



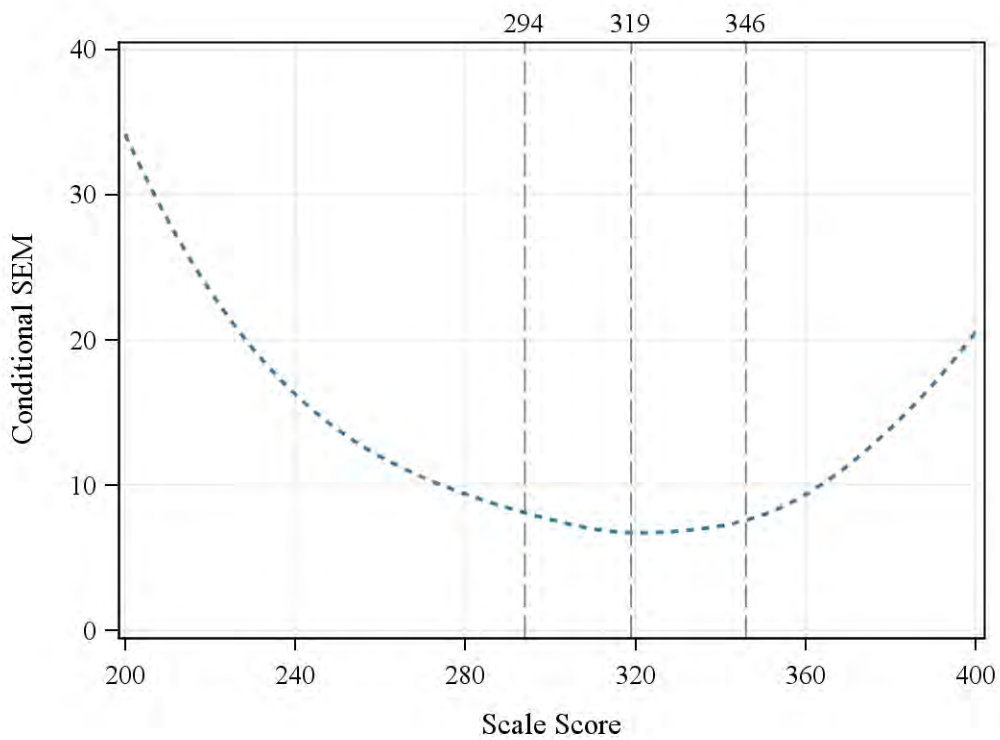
**Figure 6.15. Mathematics Grade 4 TCC**



**Figure 6.16. Mathematics Grade 4 CSEM Curve**

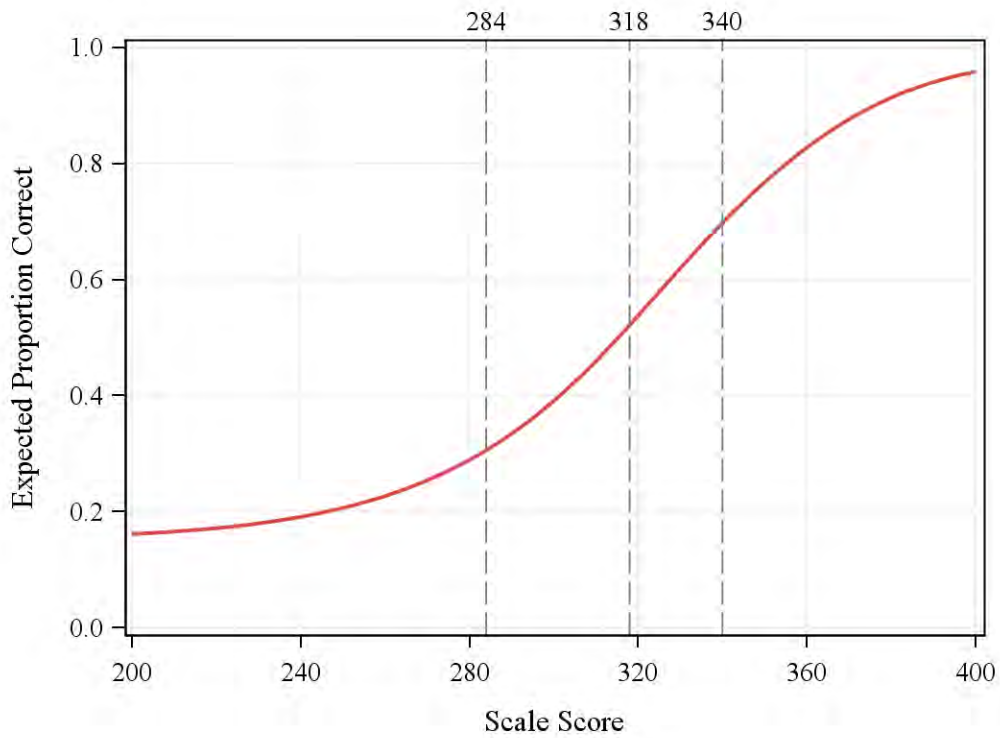


**Figure 6.17. Mathematics Grade 5 TCC**

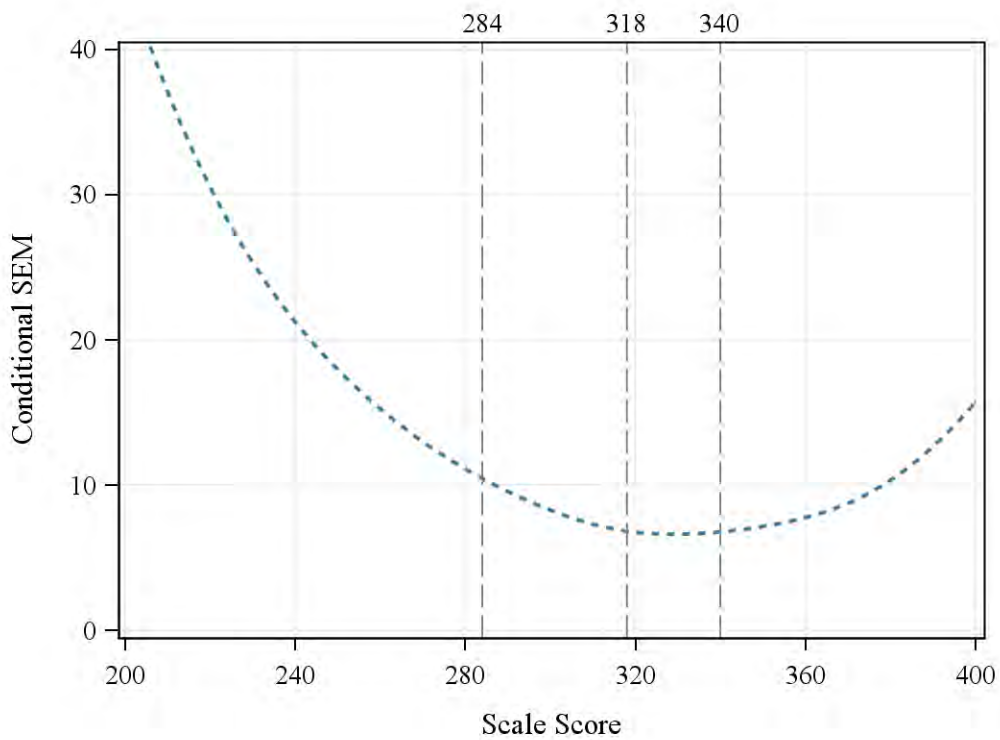


**Figure 6.18. Mathematics Grade 5 CSEM Curve**

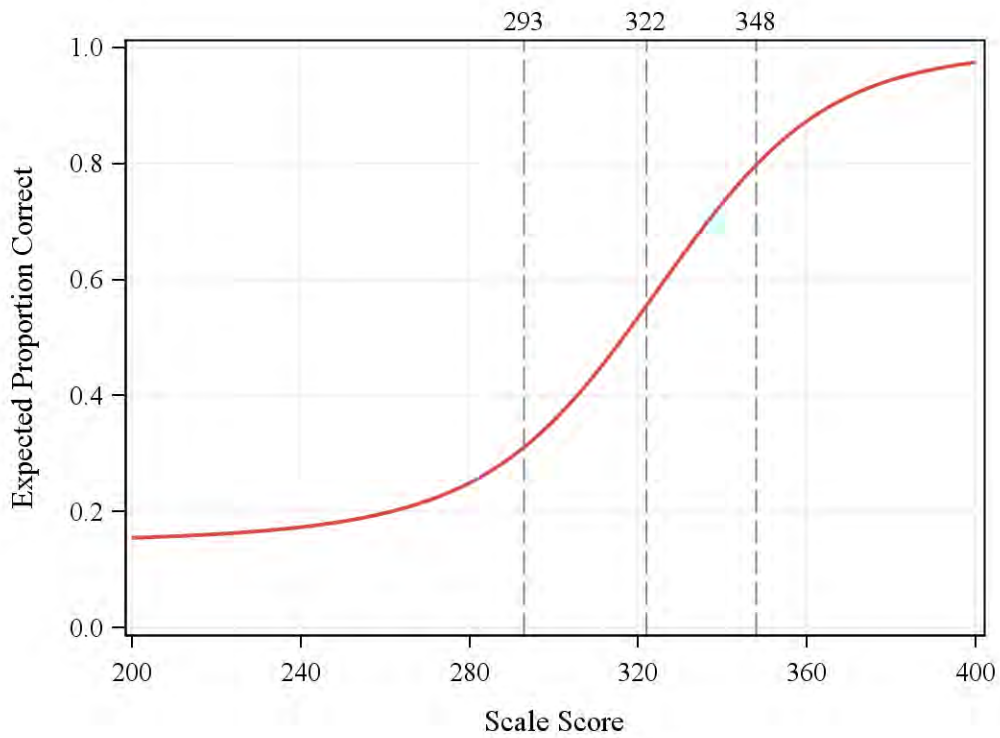




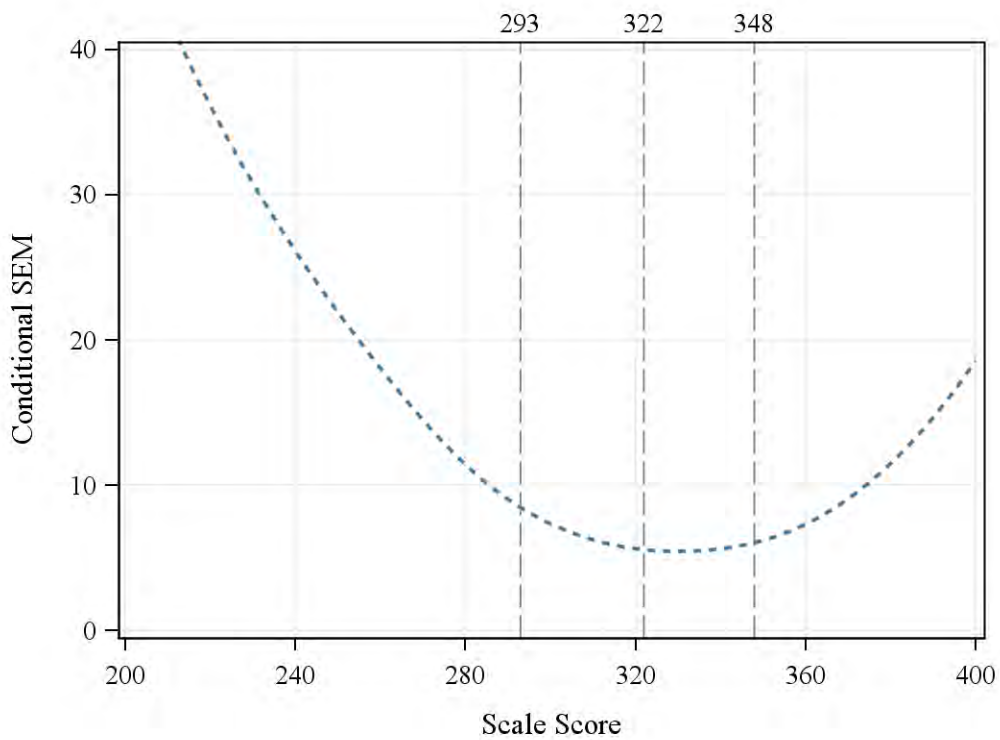
**Figure 6.19. Mathematics Grade 6 TCC**



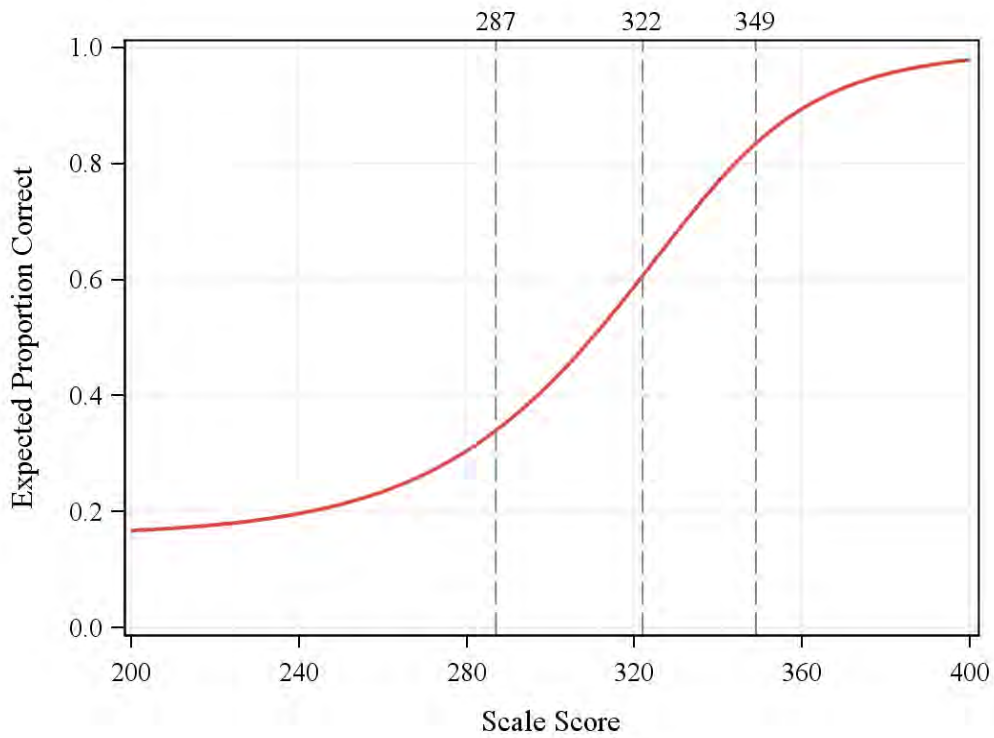
**Figure 6.20. Mathematics Grade 6 CSEM Curve**



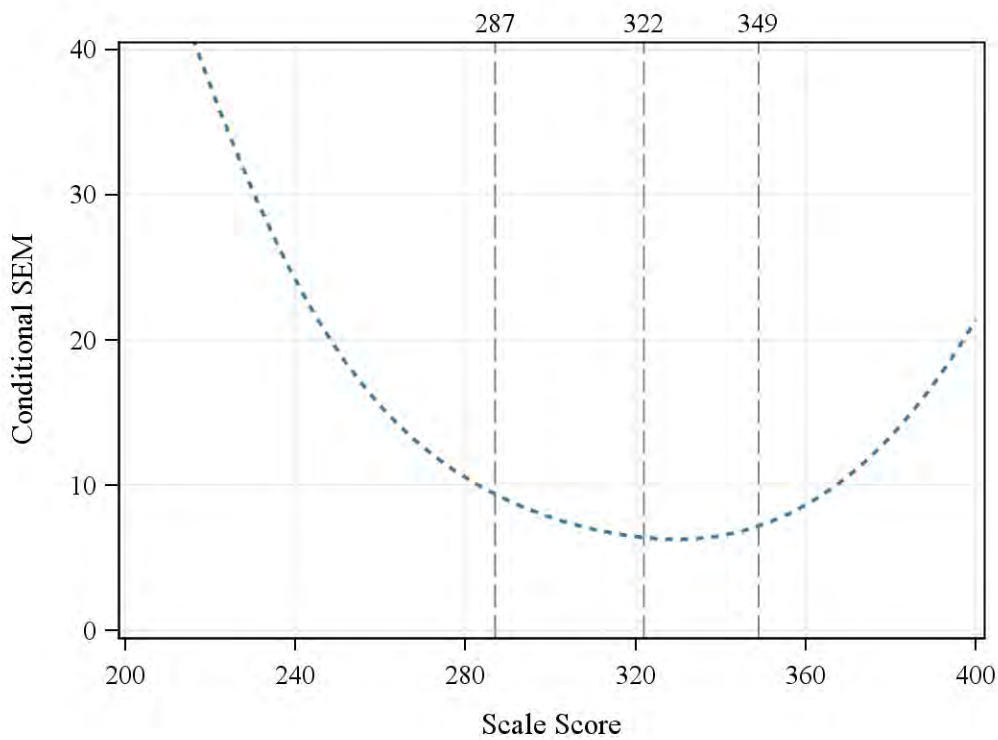
**Figure 6.21. Mathematics Grade 7 TCC**



**Figure 6.22. Mathematics Grade 7 CSEM Curve**



**Figure 6.23. Mathematics Grade 8 TCC**



**Figure 6.24. Mathematics Grade 8 CSEM Curve**

## 6.8. Scoring Procedure

New York State student examinations were scored using the number correct (NC) scoring method. This method considers how many score points that a student obtained on a test in determining his or her scale score. That is, two students with the same number of score points on the test will receive the same scale score, regardless of which items they answered correctly. In this method, the number correct (or raw) score on the test is converted to a scale score by means of a conversion table. This traditional scoring method is often preferred for its conceptual simplicity and familiarity.

As described in Section 6.5: Linking and Scaling, the final item parameters were used to calculate the raw-score-to-theta tables, using a TCC method (see the details provided below). The obtained scaling transformation intercept and slope ( $M_1^S$  and  $M_2^S$ ) were then applied to the theta values to produce raw score-to-scale score-conversion tables for the Grades 3–8 ELA Tests.

An inverse TCC method was employed using POLYEQUATE (Kolen and Cui, 2004). The inverse of the TCC procedure produces trait values (i.e., proficiency) based on unweighted raw scores. These estimates show negligible statistical bias (defined in statistics as the difference between an estimator's expected value and the true value of the parameter being estimated) for tests with maximum possible raw scores of at least 30 points. All NYSTP ELA and mathematics tests have a maximum raw score higher than 30 points. In the inverse TCC method, a student's trait (i.e., proficiency) estimate is taken to be the trait value that has an expected raw score equal to the student's observed raw score. It was found that, for tests containing only MC items, the inverse of the TCC is an excellent first-order approximation of the number of correct maximum likelihood estimates (MLE) showing negligible bias for tests of at least 30 items. For tests with a mixture of MC and CR items, the MLE and TCC estimates are even more similar (Yen, 1984).

The inverse of the TCC method relies on the following equation:

$$\sum_{i=1}^n v_i x_i = \sum_{i=1}^n v_i E(X_i | \tilde{\theta})$$

where:

- $x_i$  is a student's observed raw score on item  $i$ ,
- $v_i$  is a non-optimal weight specified in a scoring process ( $v_i = 1$  if no weights are specified), and
- $\tilde{\theta}$  is a trait estimate.

Potential differences in test form difficulty at different performance levels are accounted for in the linking and in the resulting raw score-to-scale score conversion tables, so that students of the same proficiency are expected to obtain the same scale score, regardless of which form they took.

### 6.8.1. Raw Score-to-Scale Score and SEM Conversion Tables

The scale score is the basic score for the NYSTP. Raw score-to-scale score (RSSS) conversion tables based on the total number correct are presented in Appendix Q, Tables Q1–Q12.

The standard error (SE) of a scale score indicates the precision with which the proficiency is estimated, and it inversely is related to the amount of information provided by the test at each performance level. The SE is estimated as follows:

$$SE(\hat{\theta}) = \frac{1}{\sqrt{I(\theta)}}$$

where

$SE(\hat{\theta})$  is the standard error of the scale score (theta).

$I(\theta)$  is the amount of information provided by the test at a given performance level.

The information is estimated based on thetas in the scale score metric; therefore, the SE is also expressed in the scale score metric. The SE value varies across performance levels and is the highest at the extreme ends of the scale where the amount of test information is typically the lowest. The final element of the raw score-to-scale score tables is the application of the performance level cut scores.

The linking procedure described above does not guarantee that the same scale score scale points selected as performance-level cut scores will be observed. It was important to appropriately reflect the performance levels set by the standard setting panel and approved by the Commissioner in Summer 2013. To that end, if a given scale score cut was not observed in the 2016 RSSS table, the nearest, but lower, scale score value was rounded up to the established scale score cut. In this way, the approved scale score cuts set in 2013 were maintained for 2016.

Tables 6.13 and 6.14 for ELA and Mathematics, respectively, present the raw- and scale-score performance level cut scores.

**Table 6.13. ELA Performance-Level Cut Scores**

| Performance Level | Raw Score Cut<br>(Scale Score Cut) |             |             |             |             |             |
|-------------------|------------------------------------|-------------|-------------|-------------|-------------|-------------|
|                   | Grade 3                            | Grade 4     | Grade 5     | Grade 6     | Grade 7     | Grade 8     |
| NYS Level II      | 19<br>(291)                        | 19<br>(287) | 32<br>(289) | 27<br>(283) | 26<br>(287) | 31<br>(284) |
| NYS Level III     | 28<br>(320)                        | 29<br>(320) | 41<br>(320) | 39<br>(320) | 39<br>(318) | 44<br>(316) |
| NYS Level IV      | 39<br>(358)                        | 36<br>(343) | 48<br>(346) | 45<br>(338) | 47<br>(347) | 51<br>(343) |

**Table 6.14. Mathematics Performance-Level Cut Scores**

| Performance Level | Raw Score Cut (Scale Score Cut) |             |             |             |             |             |
|-------------------|---------------------------------|-------------|-------------|-------------|-------------|-------------|
|                   | Grade 3                         | Grade 4     | Grade 5     | Grade 6     | Grade 7     | Grade 8     |
| NYS Level II      | 24<br>(285)                     | 25<br>(283) | 24<br>(294) | 20<br>(284) | 21<br>(293) | 23<br>(287) |
| NYS Level III     | 37<br>(314)                     | 41<br>(314) | 36<br>(319) | 35<br>(318) | 38<br>(322) | 41<br>(322) |
| NYS Level IV      | 46<br>(340)                     | 52<br>(341) | 48<br>(346) | 46<br>(340) | 54<br>(348) | 56<br>(349) |

## Section 7: Reliability and Standard Error of Measurement

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This section presents specific information on various test reliability statistics and standard error of measurement (SEM), as well as the results from a study of performance level classification accuracy and consistency. The data set for these studies includes all tested New York State students who received valid scores.

### 7.1. Test Reliability

Test reliability is directly related to score stability and standard error and, as such, is an essential element of fairness and validity. Test reliability can be directly measured with an alpha statistic, or the alpha statistic can be used to derive the SEM. For the Grades 3–8 Common Core ELA and Mathematics Tests, we calculated two types of reliability statistics: Cronbach’s alpha (Cronbach, 1951) and Feldt-Raju coefficient (Qualls, 1995). These two measures are appropriate for assessment of a test’s internal consistency when a single test is administered to a group of examinees on one occasion. The reliability of the test is then estimated by considering how well the items that reflect the same construct yield similar results (or how consistent the results are for different items that reflect the same construct measured by the test). Both Cronbach’s alpha and Feldt-Raju coefficient measures are appropriate for tests of multiple-item formats (MC and CR items).

#### 7.1.1. *Test Statistics and Reliability for Total Test*

Tables 7.1 and 7.3 present the test statistics including raw-score (RS) means and raw-score standard deviations (SDs) for ELA and Mathematics, respectively. These statistics give the necessary context for Tables 7.2 and 7.4, which present the case counts (n-count), number of test items (# Items), Cronbach’s alpha and associated SEM, and Feldt-Raju coefficient and associated SEM obtained for the total ELA and mathematics tests. Reliability coefficients provide measures of internal consistency that range from zero to one. High reliability indicates that scores are consistent and not unduly influenced by random error. Overall test reliability is a very good indication of each test’s internal consistency.

Grades 3–8 ELA reliability estimates (Cronbach’s alpha and Feldt-Raju) ranged from 0.89 to 0.93. Grades 3–8 Mathematics reliability estimates (Cronbach’s alpha and Feldt-Raju) ranged from 0.92 to 0.95. The reliabilities are similar across grades and slightly higher for the Mathematics tests than for the ELA tests. All reliabilities were at least .89 across all grades and both subjects, which is a good indication that the NYSTP Grades 3–8 Common Core ELA and Mathematics Tests are acceptably reliable.

**Table 7.1. ELA Test Form Statistics**

| Grade | Item-level |      |      | Student-level |           |       |       |
|-------|------------|------|------|---------------|-----------|-------|-------|
|       | P-value    |      |      | N-Count       | Raw Score |       |       |
|       | Mean       | Min. | Max. |               | Max.      | Mean  | SD    |
| 3     | 0.57       | 0.30 | 0.90 | 173,695       | 47        | 24.98 | 9.41  |
| 4     | 0.55       | 0.39 | 0.75 | 171,185       | 47        | 25.59 | 9.06  |
| 5     | 0.62       | 0.36 | 0.87 | 160,808       | 57        | 34.59 | 10.63 |
| 6     | 0.57       | 0.33 | 0.78 | 158,210       | 57        | 33.09 | 10.40 |
| 7     | 0.57       | 0.29 | 0.79 | 148,857       | 57        | 32.75 | 11.31 |
| 8     | 0.68       | 0.42 | 0.96 | 143,555       | 57        | 38.82 | 11.12 |

**Table 7.2. ELA Test Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Raw Score Points | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------------------|------|------------------------|------|
|       |         |       |                  | Est.             | SEM  | Est.                   | SEM  |
| 3     | 173,695 | 34    | 47               | 0.91             | 2.86 | 0.91                   | 2.75 |
| 4     | 171,185 | 34    | 47               | 0.89             | 3.05 | 0.90                   | 2.90 |
| 5     | 160,808 | 44    | 57               | 0.91             | 3.27 | 0.91                   | 3.13 |
| 6     | 158,210 | 44    | 57               | 0.89             | 3.39 | 0.90                   | 3.23 |
| 7     | 148,857 | 44    | 57               | 0.91             | 3.42 | 0.92                   | 3.23 |
| 8     | 143,555 | 44    | 57               | 0.92             | 3.16 | 0.93                   | 2.99 |

**Table 7.3. Mathematics Test Form Statistics**

| Grade | Item-level |      |      | Student-level |           |       |       |
|-------|------------|------|------|---------------|-----------|-------|-------|
|       | P-value    |      |      | N-Count       | Raw Score |       |       |
|       | Mean       | Min. | Max. |               | Max.      | Mean  | SD    |
| 3     | 0.63       | 0.24 | 0.90 | 178,870       | 56        | 33.51 | 12.63 |
| 4     | 0.61       | 0.23 | 0.83 | 174,321       | 62        | 36.26 | 15.41 |
| 5     | 0.56       | 0.20 | 0.86 | 162,992       | 61        | 31.72 | 13.82 |
| 6     | 0.51       | 0.12 | 0.85 | 161,216       | 67        | 31.75 | 14.70 |
| 7     | 0.49       | 0.28 | 0.80 | 147,252       | 68        | 31.83 | 16.39 |
| 8     | 0.49       | 0.19 | 0.83 | 115,190       | 68        | 30.14 | 15.04 |



**Table 7.4. Mathematics Test Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Raw Score Points | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------------------|------|------------------------|------|
|       |         |       |                  | Est.             | SEM  | Est.                   | SEM  |
| 3     | 178,870 | 45    | 56               | 0.92             | 3.51 | 0.93                   | 3.28 |
| 4     | 174,321 | 48    | 62               | 0.95             | 3.60 | 0.95                   | 3.38 |
| 5     | 162,992 | 47    | 61               | 0.93             | 3.54 | 0.94                   | 3.38 |
| 6     | 161,216 | 53    | 67               | 0.94             | 3.74 | 0.94                   | 3.53 |
| 7     | 147,252 | 54    | 68               | 0.94             | 3.86 | 0.95                   | 3.63 |
| 8     | 115,190 | 54    | 68               | 0.93             | 3.91 | 0.94                   | 3.70 |

**7.1.2. Reliability of MC Items**

In addition to overall test reliability, Cronbach's alpha and Feldt-Raju coefficient were computed separately for MC and CR item sets. It is important to recognize that reliability is directly affected by test length; therefore, reliability estimates for tests by item type will always be lower than reliability estimates for the overall test form. Tables 7.5 and 7.6 present reliabilities for the subsets of MC items.

**Table 7.5. ELA MC Item Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------|------------------------|------|
|       |         |       | Est.             | SEM  | Est.                   | SEM  |
| 3     | 173,695 | 25    | 0.85             | 2.11 | 0.85                   | 2.11 |
| 4     | 171,185 | 25    | 0.79             | 2.28 | 0.79                   | 2.27 |
| 5     | 160,808 | 35    | 0.85             | 2.56 | 0.85                   | 2.55 |
| 6     | 158,210 | 35    | 0.81             | 2.69 | 0.82                   | 2.69 |
| 7     | 148,857 | 35    | 0.84             | 2.67 | 0.84                   | 2.66 |
| 8     | 143,555 | 35    | 0.87             | 2.47 | 0.87                   | 2.46 |

**Table 7.6. Mathematics MC Item Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------|------------------------|------|
|       |         |       | Est.             | SEM  | Est.                   | SEM  |
| 3     | 178,870 | 37    | 0.91             | 2.43 | 0.91                   | 2.40 |
| 4     | 174,321 | 38    | 0.93             | 2.49 | 0.93                   | 2.48 |
| 5     | 162,992 | 37    | 0.91             | 2.55 | 0.91                   | 2.53 |
| 6     | 161,216 | 43    | 0.90             | 2.79 | 0.90                   | 2.77 |
| 7     | 147,252 | 44    | 0.92             | 2.89 | 0.92                   | 2.88 |
| 8     | 115,190 | 44    | 0.90             | 2.94 | 0.90                   | 2.93 |

### 7.1.3. Reliability of CR Items

Reliability coefficients were also computed for the subsets of CR items. The results are presented in Tables 7.7 and 7.8.

**Table 7.7. ELA CR Item Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Raw Score Points | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------------------|------|------------------------|------|
|       |         |       |                  | Est.             | SEM  | Est.                   | SEM  |
| 3     | 173,695 | 9     | 22               | 0.87             | 1.70 | 0.88                   | 1.66 |
| 4     | 171,185 | 9     | 22               | 0.87             | 1.77 | 0.88                   | 1.69 |
| 5     | 160,808 | 9     | 22               | 0.87             | 1.76 | 0.88                   | 1.69 |
| 6     | 158,210 | 9     | 22               | 0.88             | 1.74 | 0.89                   | 1.65 |
| 7     | 148,857 | 9     | 22               | 0.90             | 1.77 | 0.91                   | 1.68 |
| 8     | 143,555 | 9     | 22               | 0.89             | 1.66 | 0.90                   | 1.55 |

Results should be interpreted with caution because the number of items is low.

**Table 7.8. Mathematics CR Item Reliability and Standard Error of Measurement**

| Grade | N-Count | Items | Raw Score Points | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|-------|---------|-------|------------------|------------------|------|------------------------|------|
|       |         |       |                  | Est.             | SEM  | Est.                   | SEM  |
| 3     | 178,870 | 8     | 19               | 0.81             | 2.31 | 0.82                   | 2.20 |
| 4     | 174,321 | 10    | 24               | 0.87             | 2.38 | 0.88                   | 2.28 |
| 5     | 162,992 | 10    | 24               | 0.85             | 2.28 | 0.86                   | 2.23 |
| 6     | 161,216 | 10    | 24               | 0.87             | 2.23 | 0.88                   | 2.17 |
| 7     | 147,252 | 10    | 24               | 0.89             | 2.23 | 0.90                   | 2.17 |
| 8     | 115,190 | 10    | 24               | 0.88             | 2.26 | 0.88                   | 2.22 |

Results should be interpreted with caution because the number of items is low.

### 7.1.4. Test Reliability for Reporting Categories

In this section, reliability coefficients that were estimated for the population and subgroups are presented. The reporting categories include the following: gender, ethnicity, NRC, ELL, all SWD, all SUA, students with disabilities using accommodations falling under 504 Plan (SWD/SUA), and English language learners using accommodations specific to their ELL status (ELL/SUA). Accommodations available to students under the 504 Plan include the following: Flexibility in Scheduling/Timing, Flexibility in Setting, Method of Presentation (excluding braille), Method of Response, Braille and Large-type, and others. Accommodations available to English language learners are Separate Location, Third Reading of Listening Selection, and Bilingual Dictionaries and Glossaries.

As shown in Tables 7.9 – 7.14 and Tables 7.15 – 7.20 for ELA and Mathematics, respectively, the estimated reliabilities for subgroups were close in magnitude to the test reliability estimates of the population. Cronbach's alpha reliability coefficients were all at least .79. Feldt-Raju reliability coefficients, which tend to be larger than the Cronbach's alpha estimates for the same group, were at least .80 each. These indicate a very good test internal consistency (reliability) for analyzed subgroups of examinees.

**Table 7.9. ELA Grade 3 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 173,695 | 0.91             | 2.87 | 0.91                   | 2.75 |
| Gender               | Female             | 86,132  | 0.90             | 2.87 | 0.91                   | 2.75 |
|                      | Male               | 87,563  | 0.91             | 2.86 | 0.92                   | 2.74 |
| Ethnicity            | Asian              | 17,910  | 0.90             | 2.79 | 0.91                   | 2.67 |
|                      | Black              | 31,562  | 0.90             | 2.92 | 0.91                   | 2.79 |
|                      | Hispanic           | 49,379  | 0.89             | 2.89 | 0.90                   | 2.79 |
|                      | American Indian    | 1,204   | 0.89             | 2.90 | 0.90                   | 2.77 |
|                      | Multiracial        | 4,343   | 0.91             | 2.84 | 0.92                   | 2.70 |
|                      | Pacific Islander   | 548     | 0.89             | 2.86 | 0.90                   | 2.76 |
|                      | White              | 68,749  | 0.90             | 2.85 | 0.91                   | 2.71 |
| NRC                  | New York           | 70,267  | 0.91             | 2.87 | 0.91                   | 2.75 |
|                      | Big 4 Cities       | 7,489   | 0.90             | 2.87 | 0.91                   | 2.76 |
|                      | Urban/Suburban     | 13,771  | 0.89             | 2.88 | 0.90                   | 2.78 |
|                      | Rural              | 9,539   | 0.90             | 2.86 | 0.91                   | 2.76 |
|                      | Average Needs      | 39,596  | 0.90             | 2.84 | 0.91                   | 2.73 |
|                      | Low Needs          | 17,480  | 0.88             | 2.73 | 0.89                   | 2.62 |
|                      | Charter School     | 9,645   | 0.89             | 2.88 | 0.90                   | 2.78 |
|                      | Non-Public         | 5,908   | 0.91             | 3.01 | 0.92                   | 2.82 |
| SWD                  | All Codes          | 25,125  | 0.88             | 2.83 | 0.89                   | 2.74 |
| SUA                  | All Codes          | 24,015  | 0.88             | 2.83 | 0.89                   | 2.75 |
| ELL                  | ELL=Y              | 16,574  | 0.84             | 2.89 | 0.85                   | 2.79 |
| SWD/SUA              | SUA=504 plan codes | 21,150  | 0.87             | 2.82 | 0.88                   | 2.74 |
| ELL/SUA              | SUA & ELL codes    | 3,703   | 0.80             | 2.79 | 0.81                   | 2.72 |

**Table 7.10. ELA Grade 4 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 171,185 | 0.89             | 3.06 | 0.90                   | 2.90 |
| Gender               | Female             | 84,532  | 0.88             | 3.04 | 0.89                   | 2.89 |
|                      | Male               | 86,653  | 0.89             | 3.06 | 0.90                   | 2.90 |
| Ethnicity            | Asian              | 17,504  | 0.88             | 2.95 | 0.89                   | 2.81 |
|                      | Black              | 31,862  | 0.88             | 3.08 | 0.89                   | 2.93 |
|                      | Hispanic           | 47,741  | 0.87             | 3.05 | 0.88                   | 2.91 |
|                      | American Indian    | 1,091   | 0.88             | 3.08 | 0.89                   | 2.91 |
|                      | Multiracial        | 3,689   | 0.89             | 3.05 | 0.91                   | 2.87 |
|                      | Pacific Islander   | 627     | 0.88             | 3.04 | 0.89                   | 2.87 |
|                      | White              | 68,671  | 0.88             | 3.06 | 0.90                   | 2.89 |
| NRC                  | New York           | 68,816  | 0.89             | 3.02 | 0.90                   | 2.86 |
|                      | Big 4 Cities       | 7,249   | 0.88             | 3.05 | 0.89                   | 2.89 |
|                      | Urban/Suburban     | 13,092  | 0.87             | 3.07 | 0.88                   | 2.93 |
|                      | Rural              | 9,061   | 0.88             | 3.06 | 0.89                   | 2.92 |
|                      | Average Needs      | 37,617  | 0.88             | 3.05 | 0.89                   | 2.90 |
|                      | Low Needs          | 16,928  | 0.85             | 2.97 | 0.87                   | 2.85 |
|                      | Charter School     | 8,189   | 0.86             | 3.03 | 0.87                   | 2.94 |
|                      | Non-Public         | 10,233  | 0.88             | 3.23 | 0.90                   | 2.99 |
| SWD                  | All Codes          | 26,119  | 0.86             | 2.99 | 0.87                   | 2.85 |
| SUA                  | All Codes          | 26,888  | 0.86             | 2.99 | 0.87                   | 2.87 |
| ELL                  | ELL=Y              | 14,886  | 0.81             | 3.02 | 0.83                   | 2.89 |
| SWD/SUA              | SUA=504 plan codes | 22,933  | 0.85             | 2.97 | 0.86                   | 2.85 |
| ELL/SUA              | SUA & ELL codes    | 3,724   | 0.77             | 2.90 | 0.79                   | 2.79 |

**Table 7.11. ELA Grade 5 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 160,808 | 0.90             | 3.29 | 0.91                   | 3.13 |
| Gender               | Female             | 79,090  | 0.90             | 3.24 | 0.91                   | 3.09 |
|                      | Male               | 81,718  | 0.91             | 3.30 | 0.92                   | 3.16 |
| Ethnicity            | Asian              | 16,724  | 0.90             | 3.12 | 0.91                   | 2.98 |
|                      | Black              | 30,617  | 0.90             | 3.36 | 0.91                   | 3.21 |
|                      | Hispanic           | 44,779  | 0.89             | 3.33 | 0.90                   | 3.19 |
|                      | American Indian    | 1,069   | 0.90             | 3.34 | 0.91                   | 3.17 |
|                      | Multiracial        | 2,948   | 0.91             | 3.25 | 0.92                   | 3.07 |
|                      | Pacific Islander   | 450     | 0.89             | 3.23 | 0.90                   | 3.10 |
|                      | White              | 64,221  | 0.90             | 3.24 | 0.91                   | 3.07 |
| NRC                  | New York           | 66,871  | 0.90             | 3.26 | 0.91                   | 3.12 |
|                      | Big 4 Cities       | 6,465   | 0.91             | 3.37 | 0.92                   | 3.22 |
|                      | Urban/Suburban     | 12,182  | 0.90             | 3.35 | 0.90                   | 3.22 |
|                      | Rural              | 8,489   | 0.90             | 3.33 | 0.91                   | 3.18 |
|                      | Average Needs      | 35,820  | 0.90             | 3.24 | 0.91                   | 3.10 |
|                      | Low Needs          | 16,833  | 0.87             | 3.10 | 0.88                   | 2.98 |
|                      | Charter School     | 8,373   | 0.88             | 3.27 | 0.89                   | 3.16 |
|                      | Non-Public         | 5,775   | 0.91             | 3.46 | 0.93                   | 3.20 |
| SWD                  | All Codes          | 26,701  | 0.88             | 3.37 | 0.89                   | 3.24 |
| SUA                  | All Codes          | 27,379  | 0.89             | 3.36 | 0.90                   | 3.24 |
| ELL                  | ELL=Y              | 12,013  | 0.84             | 3.40 | 0.86                   | 3.26 |
| SWD/SUA              | SUA=504 plan codes | 23,570  | 0.88             | 3.37 | 0.89                   | 3.24 |
| ELL/SUA              | SUA & ELL codes    | 3,388   | 0.81             | 3.32 | 0.82                   | 3.21 |

**Table 7.12. ELA Grade 6 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 158,210 | 0.89             | 3.40 | 0.90                   | 3.23 |
| Gender               | Female             | 77,772  | 0.88             | 3.34 | 0.89                   | 3.20 |
|                      | Male               | 80,438  | 0.90             | 3.43 | 0.91                   | 3.24 |
| Ethnicity            | Asian              | 17,183  | 0.89             | 3.19 | 0.90                   | 3.06 |
|                      | Black              | 30,271  | 0.88             | 3.45 | 0.89                   | 3.28 |
|                      | Hispanic           | 42,276  | 0.88             | 3.44 | 0.89                   | 3.28 |
|                      | American Indian    | 1,061   | 0.88             | 3.43 | 0.89                   | 3.27 |
|                      | Multiracial        | 2,513   | 0.91             | 3.36 | 0.92                   | 3.17 |
|                      | Pacific Islander   | 425     | 0.88             | 3.31 | 0.89                   | 3.18 |
|                      | White              | 64,481  | 0.89             | 3.38 | 0.90                   | 3.20 |
| NRC                  | New York           | 63,195  | 0.90             | 3.35 | 0.91                   | 3.19 |
|                      | Big 4 Cities       | 6,393   | 0.89             | 3.53 | 0.90                   | 3.32 |
|                      | Urban/Suburban     | 10,898  | 0.89             | 3.49 | 0.90                   | 3.30 |
|                      | Rural              | 8,184   | 0.88             | 3.47 | 0.90                   | 3.28 |
|                      | Average Needs      | 34,109  | 0.89             | 3.39 | 0.90                   | 3.23 |
|                      | Low Needs          | 17,046  | 0.86             | 3.23 | 0.87                   | 3.12 |
|                      | Charter School     | 9,189   | 0.86             | 3.36 | 0.87                   | 3.27 |
|                      | Non-Public         | 9,196   | 0.89             | 3.58 | 0.91                   | 3.29 |
| SWD                  | All Codes          | 25,592  | 0.86             | 3.45 | 0.87                   | 3.29 |
| SUA                  | All Codes          | 26,012  | 0.87             | 3.46 | 0.88                   | 3.29 |
| ELL                  | ELL=Y              | 11,750  | 0.82             | 3.49 | 0.84                   | 3.30 |
| SWD/SUA              | SUA=504 plan codes | 22,171  | 0.85             | 3.45 | 0.86                   | 3.29 |
| ELL/SUA              | SUA & ELL codes    | 3,359   | 0.76             | 3.39 | 0.78                   | 3.25 |

**Table 7.13. ELA Grade 7 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 148,857 | 0.91             | 3.43 | 0.92                   | 3.23 |
| Gender               | Female             | 72,555  | 0.90             | 3.36 | 0.91                   | 3.19 |
|                      | Male               | 76,302  | 0.91             | 3.44 | 0.92                   | 3.24 |
| Ethnicity            | Asian              | 16,249  | 0.90             | 3.23 | 0.91                   | 3.06 |
|                      | Black              | 29,565  | 0.89             | 3.48 | 0.91                   | 3.29 |
|                      | Hispanic           | 40,195  | 0.90             | 3.45 | 0.91                   | 3.27 |
|                      | American Indian    | 1,098   | 0.90             | 3.43 | 0.91                   | 3.25 |
|                      | Multiracial        | 2,036   | 0.92             | 3.43 | 0.93                   | 3.18 |
|                      | Pacific Islander   | 418     | 0.91             | 3.36 | 0.92                   | 3.18 |
|                      | White              | 59,296  | 0.91             | 3.41 | 0.92                   | 3.19 |
| NRC                  | New York           | 63,853  | 0.91             | 3.36 | 0.92                   | 3.17 |
|                      | Big 4 Cities       | 5,892   | 0.90             | 3.49 | 0.91                   | 3.29 |
|                      | Urban/Suburban     | 10,263  | 0.90             | 3.51 | 0.91                   | 3.31 |
|                      | Rural              | 7,777   | 0.91             | 3.50 | 0.92                   | 3.28 |
|                      | Average Needs      | 31,388  | 0.91             | 3.44 | 0.92                   | 3.23 |
|                      | Low Needs          | 16,503  | 0.88             | 3.30 | 0.89                   | 3.15 |
|                      | Charter School     | 8,180   | 0.87             | 3.39 | 0.88                   | 3.29 |
|                      | Non-Public         | 5,001   | 0.92             | 3.60 | 0.93                   | 3.28 |
| SWD                  | All Codes          | 24,134  | 0.87             | 3.41 | 0.88                   | 3.26 |
| SUA                  | All Codes          | 23,996  | 0.88             | 3.42 | 0.89                   | 3.27 |
| ELL                  | ELL=Y              | 10,342  | 0.81             | 3.39 | 0.83                   | 3.24 |
| SWD/SUA              | SUA=504 plan codes | 20,811  | 0.86             | 3.41 | 0.88                   | 3.26 |
| ELL/SUA              | SUA & ELL codes    | 2,750   | 0.76             | 3.30 | 0.77                   | 3.19 |

**Table 7.14. ELA Grade 8 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 143,555 | 0.92             | 3.17 | 0.93                   | 2.98 |
| Gender               | Female             | 69,999  | 0.91             | 3.07 | 0.92                   | 2.91 |
|                      | Male               | 73,556  | 0.92             | 3.23 | 0.93                   | 3.03 |
| Ethnicity            | Asian              | 16,027  | 0.91             | 2.87 | 0.92                   | 2.72 |
|                      | Black              | 30,083  | 0.91             | 3.28 | 0.92                   | 3.10 |
|                      | Hispanic           | 39,239  | 0.91             | 3.24 | 0.92                   | 3.07 |
|                      | American Indian    | 920     | 0.91             | 3.25 | 0.92                   | 3.07 |
|                      | Multiracial        | 1,599   | 0.93             | 3.17 | 0.94                   | 2.94 |
|                      | Pacific Islander   | 374     | 0.90             | 3.08 | 0.92                   | 2.89 |
|                      | White              | 55,313  | 0.92             | 3.10 | 0.93                   | 2.90 |
| NRC                  | New York           | 63,737  | 0.91             | 3.13 | 0.92                   | 2.96 |
|                      | Big 4 Cities       | 5,721   | 0.92             | 3.42 | 0.93                   | 3.21 |
|                      | Urban/Suburban     | 9,184   | 0.92             | 3.33 | 0.92                   | 3.14 |
|                      | Rural              | 7,307   | 0.92             | 3.26 | 0.93                   | 3.07 |
|                      | Average Needs      | 28,192  | 0.92             | 3.16 | 0.93                   | 2.97 |
|                      | Low Needs          | 14,983  | 0.90             | 2.87 | 0.91                   | 2.73 |
|                      | Charter School     | 6,816   | 0.88             | 3.08 | 0.89                   | 2.98 |
|                      | Non-Public         | 7,615   | 0.92             | 3.34 | 0.94                   | 3.03 |
| SWD                  | All Codes          | 22,459  | 0.89             | 3.38 | 0.90                   | 3.23 |
| SUA                  | All Codes          | 22,559  | 0.90             | 3.37 | 0.91                   | 3.22 |
| ELL                  | ELL=Y              | 10,095  | 0.86             | 3.43 | 0.88                   | 3.26 |
| SWD/SUA              | SUA=504 plan codes | 19,319  | 0.89             | 3.38 | 0.90                   | 3.23 |
| ELL/SUA              | SUA & ELL codes    | 2,554   | 0.83             | 3.36 | 0.84                   | 3.24 |



**Table 7.15. Mathematics Grade 3 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 178,870 | 0.92             | 3.51 | 0.93                   | 3.28 |
| Gender               | Female             | 88,423  | 0.92             | 3.51 | 0.93                   | 3.28 |
|                      | Male               | 90,447  | 0.93             | 3.52 | 0.94                   | 3.28 |
| Ethnicity            | Asian              | 18,673  | 0.92             | 3.30 | 0.93                   | 3.03 |
|                      | Black              | 32,281  | 0.92             | 3.49 | 0.93                   | 3.32 |
|                      | Hispanic           | 51,194  | 0.91             | 3.52 | 0.92                   | 3.34 |
|                      | American Indian    | 1,244   | 0.92             | 3.52 | 0.92                   | 3.33 |
|                      | Multiracial        | 4,341   | 0.93             | 3.50 | 0.94                   | 3.24 |
|                      | Pacific Islander   | 578     | 0.92             | 3.42 | 0.93                   | 3.19 |
|                      | White              | 70,559  | 0.91             | 3.50 | 0.93                   | 3.26 |
| NRC                  | New York           | 71,888  | 0.92             | 3.49 | 0.93                   | 3.26 |
|                      | Big 4 Cities       | 7,798   | 0.92             | 3.45 | 0.93                   | 3.30 |
|                      | Urban/Suburban     | 13,776  | 0.91             | 3.53 | 0.92                   | 3.36 |
|                      | Rural              | 9,429   | 0.92             | 3.56 | 0.93                   | 3.35 |
|                      | Average Needs      | 39,072  | 0.91             | 3.53 | 0.92                   | 3.29 |
|                      | Low Needs          | 17,440  | 0.90             | 3.37 | 0.92                   | 3.13 |
|                      | Charter School     | 9,565   | 0.92             | 3.38 | 0.93                   | 3.13 |
|                      | Non-Public         | 9,902   | 0.91             | 3.61 | 0.92                   | 3.40 |
| SWD                  | All Codes          | 25,933  | 0.91             | 3.43 | 0.92                   | 3.31 |
| SUA                  | All Codes          | 24,665  | 0.91             | 3.44 | 0.91                   | 3.32 |
| ELL                  | ELL=Y              | 18,590  | 0.90             | 3.43 | 0.91                   | 3.32 |
| SWD/SUA              | SUA=504 plan codes | 21,837  | 0.90             | 3.42 | 0.91                   | 3.31 |
| ELL/SUA              | SUA & ELL codes    | 3,805   | 0.89             | 3.32 | 0.89                   | 3.25 |
| ELL Test Language    | English            | 174,967 | 0.92             | 3.51 | 0.93                   | 3.28 |
|                      | Chinese            | 671     | 0.90             | 3.38 | 0.91                   | 3.14 |
|                      | Haitian-Creole     | 62      | 0.89             | 3.37 | 0.90                   | 3.23 |
|                      | Korean             | 30      | 0.90             | 3.21 | 0.91                   | 2.95 |
|                      | Russian            | 86      | 0.92             | 3.44 | 0.93                   | 3.27 |
|                      | Spanish            | 3,054   | 0.90             | 3.38 | 0.90                   | 3.28 |
|                      | All Translations   | 3,903   | 0.92             | 3.44 | 0.93                   | 3.28 |

**Table 7.16. Mathematics Grade 4 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 174,321 | 0.95             | 3.61 | 0.95                   | 3.38 |
| Gender               | Female             | 85,869  | 0.94             | 3.62 | 0.95                   | 3.40 |
|                      | Male               | 88,452  | 0.95             | 3.59 | 0.95                   | 3.36 |
| Ethnicity            | Asian              | 18,124  | 0.94             | 3.31 | 0.95                   | 3.06 |
|                      | Black              | 32,575  | 0.94             | 3.64 | 0.95                   | 3.45 |
|                      | Hispanic           | 49,396  | 0.94             | 3.65 | 0.94                   | 3.46 |
|                      | American Indian    | 1,114   | 0.94             | 3.64 | 0.95                   | 3.41 |
|                      | Multiracial        | 3,693   | 0.95             | 3.57 | 0.95                   | 3.33 |
|                      | Pacific Islander   | 656     | 0.94             | 3.56 | 0.95                   | 3.33 |
|                      | White              | 68,763  | 0.94             | 3.56 | 0.94                   | 3.35 |
| NRC                  | New York           | 70,160  | 0.95             | 3.60 | 0.95                   | 3.36 |
|                      | Big 4 Cities       | 7,329   | 0.94             | 3.57 | 0.95                   | 3.39 |
|                      | Urban/Suburban     | 12,913  | 0.94             | 3.63 | 0.94                   | 3.45 |
|                      | Rural              | 8,920   | 0.94             | 3.65 | 0.94                   | 3.45 |
|                      | Average Needs      | 37,102  | 0.94             | 3.60 | 0.94                   | 3.39 |
|                      | Low Needs          | 17,038  | 0.93             | 3.38 | 0.93                   | 3.19 |
|                      | Charter School     | 8,453   | 0.94             | 3.53 | 0.95                   | 3.29 |
|                      | Non-Public         | 12,406  | 0.93             | 3.72 | 0.94                   | 3.52 |
| SWD                  | All Codes          | 26,588  | 0.93             | 3.52 | 0.94                   | 3.37 |
| SUA                  | All Codes          | 27,045  | 0.93             | 3.55 | 0.94                   | 3.40 |
| ELL                  | ELL=Y              | 16,309  | 0.93             | 3.54 | 0.93                   | 3.40 |
| SWD/SUA              | SUA=504 plan codes | 23,246  | 0.93             | 3.51 | 0.93                   | 3.37 |
| ELL/SUA              | SUA & ELL codes    | 3,782   | 0.90             | 3.39 | 0.91                   | 3.31 |
| ELL Test Language    | English            | 170,566 | 0.94             | 3.61 | 0.95                   | 3.38 |
|                      | Chinese            | 596     | 0.93             | 3.51 | 0.94                   | 3.27 |
|                      | Haitian-Creole     | 70      | 0.90             | 3.33 | 0.90                   | 3.27 |
|                      | Korean             | 28      | 0.92             | 3.22 | 0.93                   | 2.97 |
|                      | Russian            | 107     | 0.93             | 3.71 | 0.94                   | 3.52 |
|                      | Spanish            | 2,954   | 0.92             | 3.47 | 0.93                   | 3.36 |
|                      | All Translations   | 3,755   | 0.94             | 3.54 | 0.95                   | 3.36 |

**Table 7.17. Mathematics Grade 5 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 162,992 | 0.93             | 3.54 | 0.94                   | 3.38 |
| Gender               | Female             | 79,609  | 0.93             | 3.54 | 0.94                   | 3.39 |
|                      | Male               | 83,383  | 0.94             | 3.55 | 0.94                   | 3.37 |
| Ethnicity            | Asian              | 17,389  | 0.93             | 3.46 | 0.94                   | 3.22 |
|                      | Black              | 31,457  | 0.92             | 3.47 | 0.93                   | 3.36 |
|                      | Hispanic           | 46,546  | 0.92             | 3.47 | 0.92                   | 3.39 |
|                      | American Indian    | 1,111   | 0.93             | 3.51 | 0.94                   | 3.36 |
|                      | Multiracial        | 3,027   | 0.94             | 3.56 | 0.95                   | 3.36 |
|                      | Pacific Islander   | 484     | 0.93             | 3.55 | 0.94                   | 3.37 |
|                      | White              | 62,978  | 0.93             | 3.58 | 0.94                   | 3.40 |
| NRC                  | New York           | 68,243  | 0.94             | 3.51 | 0.94                   | 3.35 |
|                      | Big 4 Cities       | 6,683   | 0.93             | 3.39 | 0.93                   | 3.27 |
|                      | Urban/Suburban     | 11,954  | 0.92             | 3.46 | 0.93                   | 3.37 |
|                      | Rural              | 8,188   | 0.92             | 3.57 | 0.93                   | 3.43 |
|                      | Average Needs      | 34,960  | 0.93             | 3.58 | 0.93                   | 3.42 |
|                      | Low Needs          | 16,695  | 0.92             | 3.53 | 0.92                   | 3.34 |
|                      | Charter School     | 9,051   | 0.93             | 3.51 | 0.93                   | 3.36 |
|                      | Non-Public         | 7,218   | 0.92             | 3.62 | 0.93                   | 3.46 |
| SWD                  | All Codes          | 26,976  | 0.91             | 3.37 | 0.91                   | 3.28 |
| SUA                  | All Codes          | 27,433  | 0.91             | 3.39 | 0.92                   | 3.29 |
| ELL                  | ELL=Y              | 13,399  | 0.90             | 3.36 | 0.90                   | 3.31 |
| SWD/SUA              | SUA=504 plan codes | 23,802  | 0.90             | 3.36 | 0.91                   | 3.27 |
| ELL/SUA              | SUA & ELL codes    | 3,408   | 0.86             | 3.23 | 0.86                   | 3.18 |
| ELL Test Language    | English            | 159,330 | 0.93             | 3.55 | 0.94                   | 3.38 |
|                      | Chinese            | 542     | 0.92             | 3.61 | 0.93                   | 3.38 |
|                      | Haitian-Creole     | 58      | 0.81             | 3.21 | 0.82                   | 3.12 |
|                      | Korean             | 30      | 0.94             | 3.49 | 0.96                   | 3.10 |
|                      | Russian            | 76      | 0.92             | 3.62 | 0.93                   | 3.37 |
|                      | Spanish            | 2,956   | 0.87             | 3.29 | 0.88                   | 3.20 |
|                      | All Translations   | 3,662   | 0.92             | 3.23 | 0.92                   | 3.34 |

**Table 7.18. Mathematics Grade 6 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 161,216 | 0.94             | 3.75 | 0.94                   | 3.54 |
| Gender               | Female             | 79,050  | 0.93             | 3.76 | 0.94                   | 3.55 |
|                      | Male               | 82,166  | 0.94             | 3.73 | 0.94                   | 3.52 |
| Ethnicity            | Asian              | 17,833  | 0.94             | 3.67 | 0.95                   | 3.41 |
|                      | Black              | 31,008  | 0.92             | 3.63 | 0.92                   | 3.48 |
|                      | Hispanic           | 43,781  | 0.91             | 3.68 | 0.92                   | 3.53 |
|                      | American Indian    | 1,077   | 0.92             | 3.70 | 0.93                   | 3.54 |
|                      | Multiracial        | 2,513   | 0.94             | 3.74 | 0.95                   | 3.50 |
|                      | Pacific Islander   | 455     | 0.93             | 3.76 | 0.94                   | 3.55 |
|                      | White              | 64,549  | 0.93             | 3.78 | 0.94                   | 3.58 |
| NRC                  | New York           | 64,335  | 0.94             | 3.73 | 0.95                   | 3.49 |
|                      | Big 4 Cities       | 6,440   | 0.91             | 3.48 | 0.92                   | 3.36 |
|                      | Urban/Suburban     | 10,412  | 0.91             | 3.60 | 0.92                   | 3.47 |
|                      | Rural              | 7,757   | 0.91             | 3.73 | 0.92                   | 3.58 |
|                      | Average Needs      | 33,015  | 0.93             | 3.77 | 0.93                   | 3.59 |
|                      | Low Needs          | 16,735  | 0.92             | 3.74 | 0.93                   | 3.54 |
|                      | Charter School     | 9,825   | 0.93             | 3.74 | 0.93                   | 3.55 |
|                      | Non-Public         | 12,697  | 0.92             | 3.76 | 0.93                   | 3.60 |
| SWD                  | All Codes          | 25,399  | 0.88             | 3.46 | 0.89                   | 3.37 |
| SUA                  | All Codes          | 25,399  | 0.89             | 3.49 | 0.90                   | 3.40 |
| ELL                  | ELL=Y              | 13,370  | 0.88             | 3.48 | 0.89                   | 3.38 |
| SWD/SUA              | SUA=504 plan codes | 21,808  | 0.87             | 3.44 | 0.88                   | 3.37 |
| ELL/SUA              | SUA & ELL codes    | 3,163   | 0.77             | 3.32 | 0.78                   | 3.27 |
| ELL Test Language    | English            | 156,840 | 0.93             | 3.75 | 0.94                   | 3.54 |
|                      | Chinese            | 836     | 0.92             | 3.81 | 0.93                   | 3.58 |
|                      | Haitian-Creole     | 59      | 0.87             | 3.42 | 0.88                   | 3.33 |
|                      | Korean             | 32      | 0.94             | 3.73 | 0.95                   | 3.39 |
|                      | Russian            | 122     | 0.94             | 3.68 | 0.94                   | 3.45 |
|                      | Spanish            | 3,327   | 0.81             | 3.37 | 0.82                   | 3.32 |
|                      | All Translations   | 4,376   | 0.92             | 3.55 | 0.93                   | 3.40 |

**Table 7.19. Mathematics Grade 7 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 147,252 | 0.94             | 3.87 | 0.95                   | 3.63 |
| Gender               | Female             | 71,650  | 0.94             | 3.88 | 0.95                   | 3.64 |
|                      | Male               | 75,602  | 0.95             | 3.84 | 0.95                   | 3.61 |
| Ethnicity            | Asian              | 16,614  | 0.95             | 3.66 | 0.96                   | 3.43 |
|                      | Black              | 29,690  | 0.93             | 3.76 | 0.93                   | 3.59 |
|                      | Hispanic           | 41,116  | 0.93             | 3.83 | 0.93                   | 3.64 |
|                      | American Indian    | 1,087   | 0.93             | 3.83 | 0.94                   | 3.64 |
|                      | Multiracial        | 1,942   | 0.95             | 3.86 | 0.96                   | 3.61 |
|                      | Pacific Islander   | 432     | 0.95             | 3.86 | 0.95                   | 3.62 |
|                      | White              | 56,371  | 0.94             | 3.89 | 0.95                   | 3.68 |
| NRC                  | New York           | 64,686  | 0.95             | 3.82 | 0.96                   | 3.57 |
|                      | Big 4 Cities       | 5,826   | 0.91             | 3.63 | 0.92                   | 3.48 |
|                      | Urban/Suburban     | 9,475   | 0.91             | 3.76 | 0.92                   | 3.60 |
|                      | Rural              | 7,140   | 0.92             | 3.90 | 0.93                   | 3.72 |
|                      | Average Needs      | 28,987  | 0.93             | 3.93 | 0.94                   | 3.72 |
|                      | Low Needs          | 15,649  | 0.93             | 3.81 | 0.94                   | 3.64 |
|                      | Charter School     | 8,474   | 0.94             | 3.83 | 0.95                   | 3.64 |
|                      | Non-Public         | 7,015   | 0.93             | 3.92 | 0.94                   | 3.72 |
| SWD                  | All Codes          | 23,429  | 0.89             | 3.54 | 0.89                   | 3.44 |
| SUA                  | All Codes          | 22,893  | 0.90             | 3.58 | 0.91                   | 3.47 |
| ELL                  | ELL=Y              | 11,285  | 0.89             | 3.52 | 0.90                   | 3.43 |
| SWD/SUA              | SUA=504 plan codes | 19,956  | 0.88             | 3.52 | 0.88                   | 3.43 |
| ELL/SUA              | SUA & ELL codes    | 2,520   | 0.77             | 3.32 | 0.77                   | 3.29 |
| ELL Test Language    | English            | 143,169 | 0.94             | 3.87 | 0.95                   | 3.64 |
|                      | Chinese            | 814     | 0.94             | 3.79 | 0.95                   | 3.59 |
|                      | Haitian-Creole     | 55      | 0.64             | 3.13 | 0.65                   | 3.12 |
|                      | Korean             | 25      | 0.94             | 3.53 | 0.94                   | 3.34 |
|                      | Russian            | 88      | 0.89             | 3.86 | 0.90                   | 3.73 |
|                      | Spanish            | 3,101   | 0.83             | 3.43 | 0.83                   | 3.38 |
|                      | All Translations   | 4,083   | 0.94             | 3.60 | 0.94                   | 3.44 |

**Table 7.20. Mathematics Grade 8 Test Reliability by Subgroup**

| Demographic Category |                    | N-Count | Cronbach's Alpha |      | Feldt-Raju Coefficient |      |
|----------------------|--------------------|---------|------------------|------|------------------------|------|
|                      |                    |         | Est.             | SEM  | Est.                   | SEM  |
| State                | All Items          | 115,190 | 0.93             | 3.94 | 0.94                   | 3.68 |
| Gender               | Female             | 55,286  | 0.93             | 3.97 | 0.94                   | 3.70 |
|                      | Male               | 59,904  | 0.93             | 3.91 | 0.94                   | 3.66 |
| Ethnicity            | Asian              | 11,147  | 0.94             | 3.99 | 0.95                   | 3.57 |
|                      | Black              | 26,458  | 0.92             | 3.78 | 0.93                   | 3.60 |
|                      | Hispanic           | 35,547  | 0.92             | 3.85 | 0.93                   | 3.65 |
|                      | American Indian    | 761     | 0.92             | 3.83 | 0.93                   | 3.62 |
|                      | Multiracial        | 1,184   | 0.93             | 3.93 | 0.94                   | 3.68 |
|                      | Pacific Islander   | 315     | 0.94             | 4.02 | 0.95                   | 3.64 |
|                      | White              | 39,778  | 0.92             | 4.03 | 0.93                   | 3.77 |
| NRC                  | New York           | 53,996  | 0.94             | 3.92 | 0.95                   | 3.63 |
|                      | Big 4 Cities       | 5,128   | 0.91             | 3.56 | 0.92                   | 3.42 |
|                      | Urban/Suburban     | 7,474   | 0.89             | 3.69 | 0.89                   | 3.57 |
|                      | Rural              | 5,520   | 0.90             | 3.88 | 0.91                   | 3.71 |
|                      | Average Needs      | 18,111  | 0.90             | 3.99 | 0.91                   | 3.79 |
|                      | Low Needs          | 8,222   | 0.92             | 4.06 | 0.93                   | 3.78 |
|                      | Charter School     | 5,926   | 0.94             | 3.96 | 0.95                   | 3.66 |
|                      | Non-Public         | 10,813  | 0.93             | 4.03 | 0.94                   | 3.76 |
| SWD                  | All Codes          | 20,663  | 0.88             | 3.50 | 0.89                   | 3.42 |
| SUA                  | All Codes          | 20,360  | 0.89             | 3.54 | 0.90                   | 3.45 |
| ELL                  | ELL=Y              | 11,447  | 0.91             | 3.56 | 0.91                   | 3.45 |
| SWD/SUA              | SUA=504 plan codes | 17,652  | 0.88             | 3.48 | 0.88                   | 3.40 |
| ELL/SUA              | SUA & ELL codes    | 2,449   | 0.82             | 3.32 | 0.83                   | 3.27 |
| ELL Test Language    | English            | 111,234 | 0.93             | 3.95 | 0.94                   | 3.69 |
|                      | Chinese            | 743     | 0.93             | 3.99 | 0.94                   | 3.60 |
|                      | Haitian-Creole     | 48      | 0.75             | 3.57 | 0.75                   | 3.52 |
|                      | Korean             | 23      | 0.92             | 3.97 | 0.94                   | 3.52 |
|                      | Russian            | 122     | 0.93             | 3.86 | 0.94                   | 3.65 |
|                      | Spanish            | 3,020   | 0.87             | 3.47 | 0.87                   | 3.43 |
|                      | All Translations   | 3,956   | 0.94             | 3.70 | 0.94                   | 3.49 |

**7.2. Standard Error of Measurement (SEM)**

Tables 7.2 and 7.4 present the SEMs, as computed from Cronbach's alpha and the Feldt-Raju reliability statistics, for ELA and Mathematics, respectively. The SEMs ranged from 2.75 to 3.91 across subjects, grades, and the two methods of estimation, which is reasonable and small. The SEMs are directly related to reliability: the higher the reliability, the lower the standard error. As discussed, the reliability of these tests is relatively high, so it was expected that the SEMs would be very low.

The SEMs for subpopulations, as computed from Cronbach's alpha and the Feldt-Raju reliability statistics, are presented in Tables 7.9 – 7.14 and Tables 7.15 – 7.20. The SEMs associated with all reliability estimates for all subjects, grades, methods of estimation, and subpopulations ranged from 2.62 to 4.06, which is acceptably close to those for the entire population. This narrow range indicates that across the Grades 3–8 Common Core ELA and Mathematics Tests, all students' test scores are reasonably reliable with minimal error.

### **7.3. Performance Level Classification Consistency and Accuracy**

This subsection describes the analyses conducted to estimate performance level classification consistency and accuracy for the Grades 3–8 Common Core ELA and Mathematics Tests. In other words, this provides statistical information on the classification of students into the four performance categories. Classification consistency refers to the estimated degree of agreement between examinees' performance classification from two independent administrations of the same test (or from two parallel forms of the test). Because obtaining test scores from two independent administrations of New York State tests was not feasible due to item release after each administration, a psychometric model was used to obtain the estimated classification consistency indices, using test scores from a single administration. Classification accuracy can be defined as the agreement between the actual classifications using observed cut scores and true classifications based on known true cut scores (Livingston and Lewis, 1995).

In conjunction with measures of internal consistency, classification consistency is an important type of reliability and is particularly relevant to high-stakes pass/fail tests. As a form of reliability, classification consistency represents how reliably students can be classified into performance categories.

Classification consistency is most relevant for students whose proficiency is near the pass/fail cut score. For example, consider the cut score delineating Levels II and III or simply the "Level III Cut." Students whose proficiency is far above or far below that cut score are unlikely to be misclassified because repeated administration of the test will nearly always result in the same classification. Examinees whose true scores are close to the cut score are a more serious concern. These students' true scores will likely lie within the SEM of the cut score. For this reason, the measurement error at the cut scores should be considered when evaluating the classification consistency of a test. Furthermore, the number of students near the cut scores should also be considered when evaluating classification consistency; these numbers show the number of students who are most likely to be misclassified. Scoring tables with SEMs are located in Section 6, "IRT Calibration and Scaling," and student scale score frequency distributions are located in Appendix Q. Classification consistency and accuracy were estimated using the IRT procedure suggested by Lee, Hanson, and Brennan (2002) and Wang, Kolen, and Harris (2000). Appendix P includes a description of the calculations and procedure based on the paper by Lee et al. (2002).

#### **7.3.1. Consistency**

The results for classifying students into four performance levels are separated from results based solely on the Level III cut. Table 7.21 and 7.22 include case counts (n-count), classification consistency (Agreement), classification inconsistency (Inconsistency), and Cohen's kappa (Kappa). Consistency indicates the rate that a second administration would yield the same performance category designation (or a different designation for the inconsistency rate). The

agreement index is a sum of the diagonal element in the contingency table. Kappa is similar, but corrects for chance agreement. The inconsistency index is equal to the “1 - agreement index.”

Table 7.21 depicts the ELA and Mathematics consistency study results, based on the range of performance levels for all grades. For ELA, 69–75% of students were estimated to be classified consistently to one of the four performance categories with a hypothetical second administration. Kappa—which corrects for chance agreement—ranged from 0.56 to 0.63. These are between “moderate” and “substantial” agreement, as per Landis and Koch’s (1977) rules of thumb for kappa. For Mathematics, 74–79% of students were estimated to be classified consistently to one of the four performance categories, and kappa ranged from 0.64 to 0.70. These are all considered “substantial” agreement, by Landis and Koch’s (1977) rules of thumb for the kappa statistic. As mentioned above and for all tests, there is an acceptable amount of measurement error that all scores contain. By random chance, students testing twice may be classified first, for example, as a Level III and second as a Level IV. This is expected to occur more often for students scoring around the selected cut score, and less often for students closer to the middle of the performance level (i.e., close to the mid-point of two adjacent cut scores).

**Table 7.21. Decision Consistency (All Cuts)**

| Grade              | N-Count | Agreement | Inconsistency | Kappa |
|--------------------|---------|-----------|---------------|-------|
| <b>ELA</b>         |         |           |               |       |
| 3                  | 173,695 | 75%       | 25%           | 0.63  |
| 4                  | 171,185 | 71%       | 29%           | 0.56  |
| 5                  | 160,808 | 70%       | 30%           | 0.58  |
| 6                  | 158,210 | 69%       | 31%           | 0.56  |
| 7                  | 148,857 | 73%       | 27%           | 0.61  |
| 8                  | 143,555 | 73%       | 27%           | 0.61  |
| <b>Mathematics</b> |         |           |               |       |
| 3                  | 178,870 | 75%       | 25%           | 0.65  |
| 4                  | 174,321 | 78%       | 22%           | 0.70  |
| 5                  | 162,992 | 78%       | 22%           | 0.68  |
| 6                  | 161,216 | 74%       | 26%           | 0.64  |
| 7                  | 147,252 | 79%       | 21%           | 0.70  |
| 8                  | 115,190 | 79%       | 21%           | 0.69  |

Table 7.22 depicts the ELA and Mathematics consistency study results based on two performance levels (NYS Level II and NYS Level III) as defined by the Level III cut. For ELA, 92–98% of the classifications of individual students were estimated to remain stable with a second administration. Kappa coefficients for ELA classification consistency ranged from 0.64 to 0.71. These are considered “substantial” agreement, as per Landis and Koch’s (1977) rules of thumb for kappa. For Mathematics, 94–97% of the classifications were estimated consistently, and kappa coefficients ranged from 0.77 to 0.81. As with ELA, these statistics indicate at least “substantial” agreement (where kappa > 0.60) and some indicating “almost perfect” agreement (where kappa > 0.80), as per Landis and Koch’s (1977) rules of thumb for kappa.



**Table 7.22. Decision Consistency (Level III Cut)**

| Grade              | N-Count | Agreement | Inconsistency | Kappa |
|--------------------|---------|-----------|---------------|-------|
| <b>ELA</b>         |         |           |               |       |
| 3                  | 173,695 | 98%       | 2%            | 0.66  |
| 4                  | 171,185 | 96%       | 4%            | 0.71  |
| 5                  | 160,808 | 93%       | 7%            | 0.64  |
| 6                  | 158,210 | 92%       | 8%            | 0.67  |
| 7                  | 148,857 | 94%       | 6%            | 0.67  |
| 8                  | 143,555 | 92%       | 8%            | 0.64  |
| <b>Mathematics</b> |         |           |               |       |
| 3                  | 178,870 | 94%       | 6%            | 0.77  |
| 4                  | 174,321 | 94%       | 6%            | 0.78  |
| 5                  | 162,992 | 96%       | 4%            | 0.77  |
| 6                  | 161,216 | 95%       | 5%            | 0.81  |
| 7                  | 147,252 | 97%       | 3%            | 0.80  |
| 8                  | 115,190 | 97%       | 3%            | 0.81  |

### 7.3.2. Accuracy

Table 7.23 presents the results of classification accuracy for ELA and Mathematics across all grades. Included in the table are case counts (n-count) and classification accuracy (Accuracy) for all performance levels (All Cuts) and for the Level III cut score. By definition, accuracy associated with the Level III cut is at least as great as that with the entire set of cut scores because there are only two categories for the former, as opposed to the latter, which has four.

For ELA, the estimated accuracy rates indicate that the categorization of a student's observed performance is in agreement with the location of his or her underlying proficiency from 76% to 82% of the time across all performance levels and 94% to 99% of the time in regard to the Level III cut score. For mathematics, the estimated accuracy rates indicate that the categorization of a student's observed performance is in agreement with the location of his or her true proficiency from 81% to 85% of the time across all performance levels and 96% to 98% of the time in regard to the Level III cut score.

**Table 7.23. Decision Agreement (Accuracy) Estimates**

| Grade       | N-Count | Accuracy |               |
|-------------|---------|----------|---------------|
|             |         | All Cuts | Level III Cut |
| ELA         |         |          |               |
| 3           | 173,695 | 82%      | 99%           |
| 4           | 171,185 | 78%      | 97%           |
| 5           | 160,808 | 78%      | 95%           |
| 6           | 158,210 | 76%      | 94%           |
| 7           | 148,857 | 80%      | 96%           |
| 8           | 143,555 | 80%      | 95%           |
| Mathematics |         |          |               |
| 3           | 178,870 | 82%      | 96%           |
| 4           | 174,321 | 85%      | 96%           |
| 5           | 162,992 | 84%      | 97%           |
| 6           | 161,216 | 81%      | 96%           |
| 7           | 147,252 | 84%      | 98%           |
| 8           | 115,190 | 84%      | 98%           |

## Section 8: Summary of Operational Test Results

This section summarizes the distribution of scale score results on the NYSTP 2016 Grades 3–8 Common Core ELA and Mathematics Tests. These include the scale score means, standard deviations, percentile ranks, and performance level distributions for each grade’s population and specific subgroups. Gender, ethnic identification, NRC, ELL, SWD, and SUA variables were used to calculate the results of subgroups required for federal reporting and test equity purposes for both the ELA and mathematics tests. Additionally, the ELL/SUA subgroup is defined as English language learners who use one or more ELL-related accommodations. The SWD/SUA subgroup is defined as examinees with disabilities who use one or more disability-related accommodations falling under the 504 Plan. For the mathematics analyses, the test translation language is also indicated. (Recall that the ELA tests are not translated, as they are a measure of mastery of the English language.) ELA and mathematics data include examinees with valid scores from all public, non-public, and charter schools. Complete scale score frequency distribution tables for ELA and mathematics are located in Appendix Q.

### 8.1. Scale Score Distribution Summary

Scale score distribution summary tables for ELA and mathematics are presented and discussed. ELA scale score distributions are described first, followed by mathematics. In the following two subsections, ELA and mathematics scale score and subscore statistics are presented for all grades, and across selected subgroups in each grade level. Use caution when interpreting the statistics for subgroups with small number counts that are included in the scale score summaries.

#### 8.1.1. ELA Scale Score and Subscore Distributions

Table 8.1 shows some key statistics characterizing the distribution of ELA scale scores, while Table 8.2 summarizes the ELA subscores derived from the test in each grade. Tables 8.3 – 8.8 break down the scale scores by selected subgroups. Some general observations from these tables include: Females outperformed Males; Asian and White students outperformed their peers from other reported ethnic groups; students from Low Needs (as identified by NRC) districts outperformed students from other districts (New York City, Big 4 Cities, Urban/Suburban, Rural, Average Needs, and Charter); and ELL students, SWD, and/or SUA tended to under-perform the State population (All Students). This pattern of achievement was consistent across all grades.

**Table 8.1. ELA Scale Score Distribution Summary**

| Grade | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|-------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|       |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| 3     | 180,303 | 309.01      | 34.97 | 264              | 288              | 311              | 333              | 350              |
| 4     | 177,092 | 306.38      | 33.28 | 263              | 287              | 309              | 331              | 345              |
| 5     | 167,409 | 297.38      | 39.51 | 247              | 274              | 301              | 325              | 346              |
| 6     | 166,040 | 299.71      | 36.09 | 253              | 279              | 303              | 324              | 342              |
| 7     | 156,248 | 302.18      | 34.69 | 256              | 280              | 305              | 327              | 347              |
| 8     | 150,849 | 304.09      | 34.80 | 257              | 284              | 307              | 329              | 343              |

**Table 8.2. ELA Subscore Summary**

| Grade | Subscore | N-Count | Subscore |       |      |
|-------|----------|---------|----------|-------|------|
|       |          |         | Max.     | Mean  | SD   |
| 3     | Reading  | 180,303 | 25       | 15.19 | 5.40 |
|       | Writing  | 180,303 | 22       | 9.70  | 4.80 |
| 4     | Reading  | 177,092 | 25       | 13.54 | 4.96 |
|       | Writing  | 177,092 | 22       | 11.96 | 4.97 |
| 5     | Reading  | 167,409 | 35       | 21.55 | 6.58 |
|       | Writing  | 167,409 | 22       | 12.93 | 4.99 |
| 6     | Reading  | 166,040 | 35       | 18.74 | 6.28 |
|       | Writing  | 166,040 | 22       | 14.22 | 5.14 |
| 7     | Reading  | 156,248 | 35       | 19.30 | 6.69 |
|       | Writing  | 156,248 | 22       | 13.31 | 5.58 |
| 8     | Reading  | 150,849 | 35       | 23.21 | 6.99 |
|       | Writing  | 150,849 | 22       | 15.35 | 5.18 |

**8.1.1.1. ELA Grade 3**

Table 8.3 presents the scale score statistics and n-counts of demographic subgroups for Grade 3. The population scale score mean was 309.01 with a standard deviation of 34.97. Female students tended to outperform male students by around 9 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the state mean scale score, as did those of students from New York City, Average Needs, and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (324.57). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about two-thirds of a standard deviation below the population mean. The students with disabilities (SWD), students tested under accommodations (SUA), and English language learners (ELL) subgroups scored, on average, about one standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed, scoring about 49 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (311): Female (317), Asian (326), Multiracial (314), Pacific Islander (320), and White (317) students, those attending schools in Average (314) and Low (330) Needs districts and students attending Charter (320) and Non-Public (314) schools.

**Table 8.3. ELA Grade 3 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 180,303 | 309.01      | 34.97 | 264              | 288              | 311              | 333              | 350              |
| Gender               | Female             | 89,264  | 313.79      | 33.83 | 269              | 291              | 317              | 336              | 354              |
|                      | Male               | 91,039  | 304.32      | 35.43 | 254              | 281              | 308              | 330              | 346              |
| Ethnicity            | Asian              | 18,237  | 324.57      | 32.81 | 281              | 305              | 326              | 346              | 363              |
|                      | Black              | 33,101  | 300.63      | 34.77 | 254              | 277              | 301              | 326              | 343              |
|                      | Hispanic           | 51,232  | 300.79      | 33.10 | 254              | 281              | 305              | 323              | 339              |
|                      | American Indian    | 1,243   | 304.01      | 33.91 | 260              | 284              | 308              | 326              | 346              |
|                      | Multiracial        | 4,476   | 311.65      | 36.03 | 264              | 288              | 314              | 336              | 354              |
|                      | Pacific Islander   | 572     | 316.24      | 31.40 | 277              | 298              | 320              | 338              | 354              |
|                      | White              | 71,442  | 314.68      | 34.36 | 269              | 295              | 317              | 339              | 354              |
| NRC                  | New York           | 71,067  | 309.04      | 34.75 | 264              | 288              | 311              | 333              | 350              |
|                      | Big 4 Cities       | 7,772   | 284.61      | 37.02 | 233              | 260              | 284              | 311              | 333              |
|                      | Urban/Suburban     | 13,931  | 295.41      | 34.04 | 248              | 273              | 298              | 320              | 336              |
|                      | Rural              | 9,662   | 299.44      | 34.35 | 254              | 281              | 301              | 323              | 339              |
|                      | Average Needs      | 40,068  | 310.81      | 33.30 | 269              | 291              | 314              | 333              | 350              |
|                      | Low Needs          | 17,567  | 326.76      | 29.19 | 291              | 311              | 330              | 346              | 358              |
|                      | Charter            | 10,275  | 318.13      | 30.32 | 277              | 298              | 320              | 339              | 354              |
|                      | Non-Public         | 9,927   | 308.06      | 36.15 | 260              | 288              | 314              | 333              | 350              |
| SWD                  | All Codes          | 26,905  | 275.36      | 34.71 | 225              | 248              | 277              | 298              | 320              |
| SUA                  | All Codes          | 12,231  | 271.13      | 35.22 | 225              | 248              | 273              | 295              | 317              |
| ELL                  | ELL=Y              | 16,854  | 277.19      | 30.38 | 233              | 260              | 281              | 298              | 314              |
| SWD/SUA              | SUA=504 plan codes | 9,998   | 265.85      | 33.83 | 225              | 241              | 264              | 291              | 311              |
| ELL/SUA              | SUA & ELL codes    | 1,122   | 260.31      | 29.16 | 225              | 241              | 260              | 277              | 298              |

**8.1.1.2. ELA Grade 4**

Table 8.4 contains Grade 4 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 306.38 with a standard deviation of 33.28. Female students tended to outperform male students by around 9 scale score points. Asian, Multiracial, Pacific Islander and White students' scale score means exceeded the state mean scale score, as did those of students from New York City, Average Needs, and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (322.7). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, about one standard deviation below the mean scale score for the population. English language learners tested under accommodations were the lowest performing subgroup analyzed, scoring about 48 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (309): Female (312), Asian (324), Multiracial (312), Pacific Islander (315), and White (315) students, those from Average (312) and Low (324) Needs districts and those enrolled at Charter schools (315).

**Table 8.4. ELA Grade 4 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 177,092 | 306.38      | 33.28 | 263              | 287              | 309              | 331              | 345              |
| Gender               | Female             | 87,333  | 310.82      | 32.12 | 268              | 289              | 312              | 334              | 349              |
|                      | Male               | 89,759  | 302.05      | 33.81 | 259              | 279              | 306              | 324              | 343              |
| Ethnicity            | Asian              | 17,770  | 322.70      | 31.06 | 283              | 306              | 324              | 345              | 358              |
|                      | Black              | 33,190  | 298.31      | 32.35 | 254              | 275              | 299              | 321              | 338              |
|                      | Hispanic           | 49,393  | 299.27      | 31.30 | 259              | 279              | 299              | 321              | 338              |
|                      | American Indian    | 1,122   | 303.35      | 33.23 | 259              | 283              | 306              | 328              | 345              |
|                      | Multiracial        | 3,809   | 308.75      | 34.85 | 263              | 287              | 312              | 334              | 349              |
|                      | Pacific Islander   | 655     | 312.80      | 31.98 | 271              | 293              | 315              | 334              | 349              |
|                      | White              | 71,153  | 310.86      | 33.21 | 268              | 293              | 315              | 334              | 349              |
| NRC                  | New York           | 69,462  | 307.80      | 32.94 | 263              | 287              | 309              | 331              | 349              |
|                      | Big 4 Cities       | 7,381   | 282.05      | 34.34 | 237              | 259              | 283              | 306              | 328              |
|                      | Urban/Suburban     | 13,219  | 292.30      | 32.09 | 249              | 271              | 293              | 315              | 331              |
|                      | Rural              | 9,168   | 295.88      | 32.89 | 254              | 275              | 299              | 320              | 334              |
|                      | Average Needs      | 38,012  | 307.40      | 32.18 | 263              | 289              | 312              | 331              | 345              |
|                      | Low Needs          | 16,999  | 322.27      | 28.14 | 287              | 306              | 324              | 343              | 353              |
|                      | Charter            | 8,703   | 313.25      | 28.49 | 275              | 296              | 315              | 334              | 345              |
|                      | Non-Public         | 14,148  | 305.96      | 33.33 | 259              | 287              | 309              | 328              | 345              |
| SWD                  | All Codes          | 27,602  | 275.09      | 32.40 | 237              | 254              | 275              | 296              | 315              |
| SUA                  | All Codes          | 13,680  | 272.13      | 33.53 | 228              | 249              | 271              | 296              | 315              |
| ELL                  | ELL=Y              | 15,118  | 274.94      | 28.72 | 237              | 259              | 275              | 296              | 309              |
| SWD/SUA              | SUA=504 plan codes | 10,555  | 265.47      | 32.01 | 220              | 243              | 263              | 287              | 309              |
| ELL/SUA              | SUA & ELL codes    | 1,148   | 258.66      | 26.73 | 220              | 243              | 259              | 275              | 293              |

**8.1.1.3. ELA Grade 5**

Table 8.5 provides the scale score summary statistics by key demographic subgroups for Grade 5 students. The population scale score mean was 297.38 with a standard deviation of 39.51. Female students tended to outperform male students by around 13 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the state mean scale score, as did those of students enrolled in New York City, Average Needs, and Low Needs districts and Charter schools. Across all ethnic groups, Asian students earned the highest mean score (315.52). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, one standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest performing subgroup analyzed, scoring about 62 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (301) Female (308), Asian (320), Pacific Islander (308), and White (308) students, those from Average (304) and Low (320) Needs districts and Charter schools (304).

**Table 8.5. ELA Grade 5 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 167,409 | 297.38      | 39.51 | 247              | 274              | 301              | 325              | 346              |
| Gender               | Female             | 82,133  | 304.10      | 37.12 | 258              | 283              | 308              | 328              | 346              |
|                      | Male               | 85,276  | 290.91      | 40.66 | 239              | 268              | 295              | 320              | 337              |
| Ethnicity            | Asian              | 17,075  | 315.52      | 37.43 | 268              | 295              | 320              | 341              | 357              |
|                      | Black              | 32,270  | 287.65      | 38.18 | 239              | 265              | 292              | 314              | 332              |
|                      | Hispanic           | 46,573  | 288.87      | 37.08 | 243              | 268              | 292              | 314              | 332              |
|                      | American Indian    | 1,118   | 291.99      | 39.16 | 243              | 268              | 295              | 320              | 341              |
|                      | Multiracial        | 3,140   | 300.04      | 41.01 | 247              | 277              | 301              | 328              | 351              |
|                      | Pacific Islander   | 475     | 305.53      | 36.38 | 258              | 286              | 308              | 328              | 346              |
|                      | White              | 66,758  | 303.29      | 39.53 | 254              | 283              | 308              | 328              | 346              |
| NRC                  | New York           | 67,570  | 299.04      | 38.96 | 251              | 277              | 301              | 325              | 346              |
|                      | Big 4 Cities       | 6,751   | 268.91      | 43.52 | 208              | 243              | 271              | 298              | 321              |
|                      | Urban/Suburban     | 12,302  | 280.63      | 38.70 | 229              | 258              | 283              | 308              | 325              |
|                      | Rural              | 8,573   | 286.15      | 40.23 | 234              | 265              | 289              | 314              | 332              |
|                      | Average Needs      | 36,269  | 299.58      | 37.98 | 251              | 277              | 304              | 325              | 346              |
|                      | Low Needs          | 16,908  | 315.24      | 32.39 | 274              | 298              | 320              | 337              | 351              |
|                      | Charter            | 9,349   | 300.91      | 33.11 | 258              | 280              | 304              | 325              | 341              |
|                      | Non-Public         | 9,551   | 293.81      | 42.55 | 239              | 274              | 301              | 321              | 341              |
| SWD                  | All Codes          | 28,145  | 259.98      | 39.32 | 208              | 234              | 265              | 286              | 308              |
| SUA                  | All Codes          | 14,074  | 256.43      | 41.07 | 200              | 229              | 258              | 286              | 308              |
| ELL                  | ELL=Y              | 12,300  | 252.86      | 35.91 | 200              | 234              | 258              | 277              | 295              |
| SWD/SUA              | SUA=504 plan codes | 10,982  | 248.73      | 39.43 | 192              | 224              | 251              | 277              | 298              |
| ELL/SUA              | SUA & ELL codes    | 1,123   | 235.79      | 33.31 | 192              | 216              | 239              | 261              | 277              |

**8.1.1.4. ELA Grade 6**

Table 8.6 contains Grade 6 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 299.71 with a standard deviation of 36.09. Female students tended to outperform male students by around 12 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the state mean scale score, as did those of students enrolled in New York City, Average Needs, and Low Needs districts and Charter and Non-Public schools. Across ethnic groups, Asian students earned the highest mean score (318.64). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, one standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed, scoring about 54 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (303): Female (308), Asian (321), Multiracial (308), Pacific Islander (311), and White (308) students and those enrolled in Average (305) and Low (320) Needs districts and Non-Public schools (305).

**Table 8.6. ELA Grade 6 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 166,040 | 299.71      | 36.09 | 253              | 279              | 303              | 324              | 342              |
| Gender               | Female             | 81,474  | 305.73      | 33.58 | 263              | 285              | 308              | 327              | 347              |
|                      | Male               | 84,566  | 293.92      | 37.45 | 245              | 270              | 297              | 321              | 338              |
| Ethnicity            | Asian              | 17,545  | 318.64      | 34.01 | 276              | 300              | 321              | 342              | 357              |
|                      | Black              | 32,121  | 290.18      | 34.63 | 245              | 270              | 294              | 314              | 331              |
|                      | Hispanic           | 44,634  | 291.21      | 33.72 | 245              | 270              | 294              | 314              | 331              |
|                      | American Indian    | 1,137   | 293.00      | 35.05 | 249              | 273              | 297              | 320              | 335              |
|                      | Multiracial        | 2,672   | 304.20      | 38.43 | 253              | 279              | 308              | 331              | 352              |
|                      | Pacific Islander   | 450     | 309.17      | 33.37 | 267              | 291              | 311              | 331              | 347              |
|                      | White              | 67,481  | 304.83      | 35.81 | 260              | 285              | 308              | 327              | 347              |
| NRC                  | New York           | 63,916  | 300.70      | 35.71 | 253              | 279              | 303              | 324              | 342              |
|                      | Big 4 Cities       | 6,567   | 273.69      | 38.28 | 225              | 249              | 276              | 300              | 321              |
|                      | Urban/Suburban     | 11,045  | 283.92      | 36.43 | 236              | 260              | 288              | 308              | 327              |
|                      | Rural              | 8,286   | 291.43      | 35.68 | 245              | 270              | 294              | 320              | 335              |
|                      | Average Needs      | 35,060  | 301.19      | 35.17 | 257              | 279              | 305              | 324              | 342              |
|                      | Low Needs          | 17,152  | 316.10      | 30.40 | 279              | 300              | 320              | 335              | 352              |
|                      | Charter            | 10,479  | 301.07      | 29.84 | 263              | 283              | 303              | 321              | 338              |
|                      | Non-Public         | 13,424  | 299.90      | 37.32 | 253              | 283              | 305              | 324              | 338              |
| SWD                  | All Codes          | 27,171  | 265.36      | 34.18 | 217              | 245              | 267              | 288              | 308              |
| SUA                  | All Codes          | 13,910  | 264.44      | 36.67 | 217              | 241              | 267              | 291              | 311              |
| ELL                  | ELL=Y              | 12,212  | 259.03      | 32.46 | 217              | 241              | 260              | 283              | 297              |
| SWD/SUA              | SUA=504 plan codes | 10,623  | 257.20      | 34.94 | 209              | 236              | 257              | 283              | 300              |
| ELL/SUA              | SUA & ELL codes    | 1,035   | 245.89      | 29.85 | 209              | 225              | 245              | 267              | 285              |

**8.1.1.5. ELA Grade 7**

Table 8.7 presents the Grade 7 scale score statistics and n-counts of demographic subgroups. The population scale score mean was 302.18 with a standard deviation of 34.69. Female students tended to outperform male students by around 14 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students from New York City, Average and Low Needs districts, and Charter schools. Across ethnic groups, Asian students earned the highest mean score (319.55). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, about one standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed, scoring about 51 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (305): Female (311), Asian (324), Multiracial (311), Pacific Islander (308), and White (311) students as well as those enrolled in Low Needs districts (321) and Non-Public schools (308).



**Table 8.7. ELA Grade 7 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 156,248 | 302.18      | 34.69 | 256              | 280              | 305              | 327              | 347              |
| Gender               | Female             | 76,119  | 309.28      | 32.76 | 266              | 288              | 311              | 333              | 348              |
|                      | Male               | 80,129  | 295.44      | 35.12 | 248              | 272              | 298              | 321              | 337              |
| Ethnicity            | Asian              | 16,592  | 319.55      | 32.28 | 278              | 300              | 324              | 340              | 357              |
|                      | Black              | 31,224  | 292.78      | 32.46 | 252              | 272              | 295              | 316              | 333              |
|                      | Hispanic           | 42,218  | 294.61      | 32.18 | 252              | 275              | 295              | 316              | 333              |
|                      | American Indian    | 1,139   | 297.25      | 34.09 | 256              | 278              | 298              | 321              | 340              |
|                      | Multiracial        | 2,134   | 305.00      | 38.09 | 252              | 280              | 311              | 333              | 348              |
|                      | Pacific Islander   | 438     | 305.94      | 32.84 | 263              | 287              | 308              | 330              | 347              |
|                      | White              | 62,503  | 307.36      | 35.17 | 260              | 288              | 311              | 330              | 348              |
| NRC                  | New York           | 64,587  | 304.18      | 33.25 | 263              | 283              | 305              | 327              | 347              |
|                      | Big 4 Cities       | 6,230   | 277.32      | 35.38 | 233              | 252              | 278              | 303              | 324              |
|                      | Urban/Suburban     | 10,436  | 284.25      | 34.94 | 239              | 260              | 287              | 311              | 327              |
|                      | Rural              | 7,919   | 292.02      | 35.78 | 244              | 269              | 295              | 318              | 333              |
|                      | Average Needs      | 31,962  | 302.77      | 35.02 | 256              | 280              | 305              | 327              | 347              |
|                      | Low Needs          | 16,612  | 318.03      | 29.88 | 280              | 300              | 321              | 337              | 352              |
|                      | Charter            | 8,901   | 304.18      | 27.42 | 269              | 287              | 305              | 324              | 337              |
|                      | Non-Public         | 9,536   | 301.56      | 36.44 | 252              | 283              | 308              | 327              | 340              |
| SWD                  | All Codes          | 25,573  | 270.02      | 31.53 | 226              | 248              | 272              | 291              | 308              |
| SUA                  | All Codes          | 12,332  | 267.05      | 33.67 | 226              | 244              | 266              | 291              | 311              |
| ELL                  | ELL=Y              | 10,645  | 261.31      | 28.32 | 226              | 244              | 263              | 280              | 295              |
| SWD/SUA              | SUA=504 plan codes | 9,623   | 261.02      | 31.88 | 218              | 239              | 263              | 283              | 303              |
| ELL/SUA              | SUA & ELL codes    | 798     | 250.96      | 26.78 | 210              | 233              | 252              | 269              | 283              |

**8.1.1.6. ELA Grade 8**

Table 8.8 presents the Grade 8 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 304.09 with a standard deviation of 34.80. Female students tended to outperform male students by around 13 scale score points. Asian, Pacific Islander, and White students' scale score means exceeded the state mean scale score, as did those of students enrolled in New York City, Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (321.34). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, one standard deviation below the mean scale score for the population. English language learners tested under accommodations were the lowest performing subgroup analyzed, scoring about 51 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (307, Female (313), Asian (325), Pacific Islander (316), and White (313) students, as well as those enrolled in Low Needs districts (325) and Charter (310) and Non-Public (310) schools.

**Table 8.8. ELA Grade 8 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 150,849 | 304.09      | 34.80 | 257              | 284              | 307              | 329              | 343              |
| Gender               | Female             | 73,329  | 310.75      | 32.61 | 268              | 292              | 313              | 333              | 348              |
|                      | Male               | 77,520  | 297.79      | 35.63 | 251              | 275              | 302              | 322              | 337              |
| Ethnicity            | Asian              | 16,338  | 321.34      | 32.52 | 280              | 302              | 325              | 343              | 355              |
|                      | Black              | 31,832  | 295.31      | 32.05 | 254              | 275              | 297              | 319              | 333              |
|                      | Hispanic           | 41,398  | 297.06      | 31.86 | 254              | 278              | 300              | 319              | 333              |
|                      | American Indian    | 992     | 295.24      | 35.16 | 248              | 273              | 297              | 319              | 337              |
|                      | Multiracial        | 1,731   | 304.06      | 37.43 | 251              | 280              | 307              | 329              | 348              |
|                      | Pacific Islander   | 397     | 312.10      | 31.93 | 270              | 295              | 316              | 333              | 348              |
|                      | White              | 58,161  | 309.14      | 36.08 | 262              | 290              | 313              | 333              | 348              |
| NRC                  | New York           | 64,523  | 305.16      | 32.74 | 262              | 285              | 307              | 325              | 343              |
|                      | Big 4 Cities       | 5,959   | 277.63      | 37.33 | 229              | 251              | 278              | 305              | 325              |
|                      | Urban/Suburban     | 9,608   | 289.16      | 34.52 | 245              | 265              | 292              | 313              | 333              |
|                      | Rural              | 7,445   | 295.35      | 35.66 | 248              | 273              | 300              | 319              | 337              |
|                      | Average Needs      | 28,769  | 304.54      | 36.08 | 257              | 284              | 307              | 329              | 348              |
|                      | Low Needs          | 15,112  | 320.93      | 31.06 | 280              | 305              | 325              | 343              | 355              |
|                      | Charter            | 7,442   | 308.22      | 26.26 | 275              | 292              | 310              | 325              | 343              |
|                      | Non-Public         | 11,925  | 303.98      | 36.28 | 260              | 288              | 310              | 325              | 343              |
| SWD                  | All Codes          | 23,974  | 272.43      | 31.49 | 234              | 254              | 273              | 295              | 310              |
| SUA                  | All Codes          | 11,509  | 270.34      | 34.04 | 229              | 248              | 270              | 292              | 313              |
| ELL                  | ELL=Y              | 10,518  | 261.54      | 29.50 | 225              | 245              | 262              | 284              | 297              |
| SWD/SUA              | SUA=504 plan codes | 8,921   | 264.31      | 32.31 | 225              | 245              | 265              | 288              | 305              |
| ELL/SUA              | SUA & ELL codes    | 672     | 252.76      | 26.40 | 225              | 237              | 254              | 270              | 285              |

### 8.1.2. Mathematics Scale Score Distributions

Table 8.9 shows some key statistics characterizing the distribution of mathematics scale scores, while Table 8.10 summarizes the mathematics subscores derived from the test in each grade. Tables 8.11 – 8.16 break down the scale scores by selected subgroups. Some general observations from the mathematics data are as follows: Female and Male students performed fairly consistently; Asian students scored considerably higher than other reported ethnic groups; schools belonging to Low Needs districts (as identified by the NRC code) and Charter schools outperformed most other school types (New York City, Big 4 Cities, High Needs Urban/Suburban, and Rural and Average Needs districts). Students taking the Chinese and Korean translations tended to outperform the other translation subgroups (Haitian-Creole, Spanish, and Russian); and ELLs, SWDs, and/or SUAs achieved below the State mean in most percentile ranks. This pattern of achievement was fairly consistent across all grades.

**Table 8.9. Mathematics Scale Score Distribution Summary**

| Grade | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|-------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|       |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| 3     | 180,824 | 305.89      | 39.50 | 257              | 280              | 307              | 331              | 353              |
| 4     | 177,147 | 304.60      | 40.95 | 252              | 279              | 308              | 333              | 354              |
| 5     | 166,838 | 306.51      | 39.29 | 256              | 282              | 308              | 334              | 354              |
| 6     | 163,927 | 304.67      | 41.29 | 252              | 279              | 306              | 333              | 354              |
| 7     | 151,897 | 304.56      | 39.80 | 244              | 280              | 309              | 333              | 352              |
| 8     | 117,643 | 292.72      | 41.22 | 236              | 270              | 296              | 320              | 341              |

**Table 8.10. Mathematics Subscore Summary**

| Grade | Subscore                              | N-Count | Subscore |       |      |
|-------|---------------------------------------|---------|----------|-------|------|
|       |                                       |         | Max.     | Mean  | SD   |
| 3     | Operations and Algebraic Thinking     | 180,824 | 25       | 13.56 | 6.14 |
|       | Number and Operations—Fractions       | 180,824 | 11       | 5.85  | 3.00 |
|       | Measurement and Data                  | 180,824 | 11       | 7.43  | 2.57 |
| 4     | Operations and Algebraic Thinking     | 177,147 | 11       | 5.88  | 3.12 |
|       | Number and Operations in Base Ten     | 177,147 | 16       | 9.89  | 4.28 |
|       | Number and Operations—Fractions       | 177,147 | 17       | 9.90  | 4.83 |
| 5     | Number and Operations in Base Ten     | 166,838 | 16       | 9.42  | 4.06 |
|       | Number and Operations—Fractions       | 166,838 | 23       | 11.10 | 5.60 |
|       | Measurement and Data                  | 166,838 | 7        | 3.10  | 1.78 |
| 6     | Ratios and Proportional Relationships | 163,927 | 17       | 7.86  | 4.09 |
|       | The Number System                     | 163,927 | 13       | 6.57  | 3.06 |
|       | Expressions and Equations             | 163,927 | 23       | 11.23 | 5.27 |
| 7     | Ratios and Proportional Relationships | 151,897 | 20       | 7.91  | 5.16 |
|       | The Number System                     | 151,897 | 12       | 5.88  | 3.49 |
|       | Expressions and Equations             | 151,897 | 21       | 10.71 | 5.07 |
| 8     | Expressions and Equations             | 117,643 | 28       | 12.41 | 6.50 |
|       | Functions                             | 117,643 | 11       | 5.00  | 2.76 |
|       | Geometry                              | 117,643 | 12       | 5.16  | 3.24 |

**8.1.2.1. Mathematics Grade 3**

Table 8.11 presents the Grade 3 scale score statistics and n-counts of demographic subgroups. The population scale score mean was 305.89 with a standard deviation of 39.50. Female and Male students tended to perform similarly. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the state mean scale score, as did those of students from Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (328.62). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about two-thirds of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, 0.82 standard

deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed for English forms, scoring about 45 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (307): Asian (329), Multiracial (309), Pacific Islander (316), and White (316) students, as well as those enrolled at Average (312) and Low (326) Needs districts and Charter schools (321). In terms of the 50th-percentile ranks for students using translated forms, they ranged from 271 (Haitian-Creole, n = 86) to 323 (Chinese, n = 783).

**Table 8.11. Mathematics Grade 3 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 180,824 | 305.89      | 39.50 | 257              | 280              | 307              | 331              | 353              |
| Gender               | Female             | 89,256  | 306.38      | 38.08 | 257              | 285              | 307              | 331              | 353              |
|                      | Male               | 91,568  | 305.42      | 40.82 | 252              | 280              | 307              | 331              | 358              |
| Ethnicity            | Asian              | 18,846  | 328.62      | 37.16 | 285              | 305              | 329              | 353              | 384              |
|                      | Black              | 33,026  | 293.18      | 39.26 | 241              | 268              | 293              | 319              | 341              |
|                      | Hispanic           | 51,784  | 294.78      | 36.85 | 247              | 271              | 296              | 319              | 341              |
|                      | American Indian    | 1,256   | 299.19      | 38.04 | 252              | 278              | 300              | 323              | 344              |
|                      | Multiracial        | 4,378   | 309.70      | 40.73 | 257              | 285              | 309              | 334              | 358              |
|                      | Pacific Islander   | 585     | 314.89      | 37.10 | 265              | 293              | 316              | 340              | 358              |
|                      | White              | 70,949  | 313.69      | 37.36 | 268              | 291              | 316              | 340              | 358              |
| NRC                  | New York           | 72,428  | 304.26      | 39.51 | 257              | 280              | 305              | 329              | 353              |
|                      | Big 4 Cities       | 7,883   | 278.72      | 40.46 | 226              | 252              | 278              | 305              | 331              |
|                      | Urban/Suburban     | 13,862  | 290.92      | 37.55 | 241              | 268              | 293              | 316              | 340              |
|                      | Rural              | 9,484   | 300.42      | 38.23 | 252              | 278              | 303              | 326              | 344              |
|                      | Average Needs      | 39,280  | 309.82      | 36.99 | 265              | 288              | 312              | 334              | 353              |
|                      | Low Needs          | 17,480  | 325.33      | 34.24 | 285              | 305              | 326              | 349              | 373              |
|                      | Charter            | 10,295  | 320.84      | 37.44 | 275              | 296              | 321              | 344              | 373              |
|                      | Non-Public         | 10,078  | 300.27      | 38.24 | 252              | 278              | 303              | 326              | 344              |
| SWD                  | All Codes          | 26,877  | 274.90      | 39.49 | 218              | 247              | 275              | 300              | 323              |
| SUA                  | All Codes          | 12,655  | 271.86      | 39.35 | 218              | 247              | 275              | 298              | 321              |
| ELL                  | ELL=Y              | 18,934  | 277.03      | 37.04 | 226              | 252              | 278              | 300              | 323              |
| SWD/SUA              | SUA=504 plan codes | 10,505  | 267.43      | 38.76 | 218              | 241              | 268              | 293              | 316              |
| ELL/SUA              | SUA & ELL codes    | 1,291   | 261.25      | 36.90 | 210              | 234              | 261              | 286              | 307              |
| ELL Test Language    | Chinese            | 783     | 324.86      | 33.86 | 285              | 303              | 323              | 344              | 373              |
|                      | English            | 176,525 | 306.46      | 39.27 | 257              | 285              | 307              | 331              | 353              |
|                      | Haitian-Creole     | 86      | 268.65      | 36.73 | 218              | 247              | 271              | 296              | 314              |
|                      | Korean             | 46      | 321.72      | 43.04 | 261              | 314              | 329              | 349              | 365              |
|                      | Russian            | 103     | 290.53      | 38.37 | 247              | 268              | 288              | 312              | 341              |
|                      | Spanish            | 3,281   | 272.12      | 36.24 | 218              | 247              | 275              | 298              | 319              |
|                      | All Translations   | 4,299   | 282.63      | 41.50 | 226              | 257              | 285              | 309              | 334              |

### 8.1.2.2. Mathematics Grade 4

Table 8.12 presents the Grade 4 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 304.60 with a standard deviation of 40.95. Female and Male students tended to perform similarly. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students enrolled in Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (330.43). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, 0.84 standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed for English forms, scoring about 47 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (308): Asian (333), Multiracial (311), Pacific Islander (314), and White (315) students, and those enrolled in Average (314) and Low (328) Needs districts and Charter schools (317). In terms of the 50th percentile ranks for students using translated forms, they ranged from: 260 (Haitian-Creole, n = 88) to 323 (Chinese, n = 736).

**Table 8.12. Mathematics Grade 4 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 177,147 | 304.60      | 40.95 | 252              | 279              | 308              | 333              | 354              |
| Gender               | Female             | 87,170  | 304.92      | 39.92 | 252              | 279              | 306              | 330              | 354              |
|                      | Male               | 89,977  | 304.28      | 41.93 | 247              | 277              | 308              | 333              | 354              |
| Ethnicity            | Asian              | 18,312  | 330.43      | 38.83 | 281              | 308              | 333              | 354              | 388              |
|                      | Black              | 33,016  | 289.61      | 40.05 | 241              | 263              | 291              | 315              | 341              |
|                      | Hispanic           | 49,917  | 292.87      | 38.65 | 241              | 269              | 295              | 319              | 341              |
|                      | American Indian    | 1,124   | 300.34      | 40.34 | 252              | 275              | 300              | 327              | 354              |
|                      | Multiracial        | 3,710   | 308.48      | 41.59 | 252              | 283              | 311              | 336              | 360              |
|                      | Pacific Islander   | 667     | 312.70      | 40.34 | 260              | 288              | 314              | 341              | 367              |
|                      | White              | 70,401  | 313.00      | 37.89 | 263              | 291              | 315              | 341              | 360              |
| NRC                  | New York           | 70,714  | 303.08      | 42.17 | 247              | 275              | 304              | 330              | 360              |
|                      | Big 4 Cities       | 7,428   | 274.12      | 41.55 | 216              | 247              | 275              | 304              | 328              |
|                      | Urban/Suburban     | 12,988  | 286.87      | 39.05 | 234              | 260              | 289              | 314              | 336              |
|                      | Rural              | 8,959   | 299.13      | 37.39 | 252              | 277              | 302              | 325              | 342              |
|                      | Average Needs      | 37,253  | 309.64      | 37.21 | 260              | 289              | 314              | 333              | 354              |
|                      | Low Needs          | 17,085  | 326.61      | 34.01 | 286              | 308              | 328              | 349              | 367              |
|                      | Charter            | 8,731   | 316.40      | 38.16 | 269              | 291              | 317              | 342              | 367              |
|                      | Non-Public         | 13,989  | 300.72      | 37.94 | 252              | 279              | 302              | 325              | 345              |
| SWD                  | All Codes          | 27,416  | 270.93      | 39.32 | 216              | 247              | 269              | 297              | 321              |
| SUA                  | All Codes          | 16,683  | 271.45      | 39.38 | 216              | 247              | 272              | 299              | 321              |
| ELL                  | ELL=Y              | 17,115  | 272.32      | 37.91 | 225              | 247              | 272              | 297              | 319              |
| SWD/SUA              | SUA=504 plan codes | 13,524  | 266.06      | 38.37 | 216              | 241              | 266              | 293              | 315              |

| Demographic Category |                  | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                  |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| ELL/SUA              | SUA & ELL codes  | 1,645   | 257.17      | 33.66 | 208              | 234              | 256              | 279              | 302              |
| ELL Test Language    | Chinese          | 736     | 323.17      | 36.90 | 281              | 302              | 323              | 345              | 367              |
|                      | English          | 172,935 | 305.26      | 40.66 | 252              | 279              | 308              | 333              | 354              |
|                      | Haitian-Creole   | 88      | 259.82      | 35.61 | 208              | 234              | 260              | 287              | 304              |
|                      | Korean           | 67      | 315.91      | 42.41 | 256              | 283              | 319              | 349              | 360              |
|                      | Russian          | 121     | 296.69      | 38.16 | 252              | 275              | 297              | 319              | 342              |
|                      | Spanish          | 3,200   | 265.75      | 37.30 | 216              | 241              | 266              | 291              | 314              |
|                      | All Translations | 4,212   | 277.34      | 43.60 | 216              | 247              | 277              | 306              | 333              |

### 8.1.2.3. Mathematics Grade 5

Table 8.13 presents the Grade 5 demographic subgroup n-counts and scale score statistics. The population scale score mean was 306.51 with a standard deviation of 39.29. Female and male students tended to perform similarly. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students from Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (332.57). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, about 0.85 standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed for English forms, scoring about 45 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (308): Asian (334), Multiracial (312), Pacific Islander (312), and White (317) students, as well as those enrolled at Average (315) and Low (329) Needs districts and Charter schools (310). In terms of the 50th percentile ranks for students using translated forms, they ranged from: 265 (Haitian-Creole, n = 71) to 327 (Korean, n = 57).

**Table 8.13. Mathematics Grade 5 Scale Score Distribution by Subgroup**

| Demographic Category |                  | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                  |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students     | 166,838 | 306.51      | 39.29 | 256              | 282              | 308              | 334              | 354              |
| Gender               | Female           | 81,693  | 306.63      | 37.27 | 260              | 284              | 308              | 331              | 351              |
|                      | Male             | 85,145  | 306.40      | 41.13 | 250              | 282              | 308              | 334              | 357              |
| Ethnicity            | Asian            | 17,581  | 332.57      | 37.66 | 287              | 310              | 334              | 357              | 382              |
|                      | Black            | 31,935  | 290.42      | 37.00 | 244              | 268              | 294              | 315              | 336              |
|                      | Hispanic         | 47,015  | 295.91      | 35.40 | 250              | 275              | 297              | 319              | 338              |
|                      | American Indian  | 1,128   | 297.63      | 38.51 | 250              | 272              | 299              | 325              | 346              |
|                      | Multiracial      | 3,045   | 309.26      | 41.33 | 256              | 282              | 312              | 338              | 361              |
|                      | Pacific Islander | 491     | 312.42      | 36.33 | 265              | 290              | 312              | 338              | 357              |
|                      | White            | 65,643  | 314.93      | 37.46 | 268              | 294              | 317              | 340              | 357              |

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| NRC                  | New York           | 68,735  | 305.84      | 39.53 | 256              | 282              | 306              | 331              | 354              |
|                      | Big 4 Cities       | 6,763   | 276.51      | 41.51 | 218              | 250              | 275              | 304              | 329              |
|                      | Urban/Suburban     | 12,030  | 288.80      | 37.41 | 236              | 265              | 294              | 315              | 334              |
|                      | Rural              | 8,240   | 299.39      | 36.81 | 250              | 279              | 302              | 325              | 343              |
|                      | Average Needs      | 35,106  | 311.71      | 36.32 | 265              | 290              | 315              | 336              | 354              |
|                      | Low Needs          | 16,744  | 328.92      | 33.47 | 287              | 308              | 329              | 351              | 370              |
|                      | Charter            | 9,370   | 308.81      | 34.94 | 265              | 287              | 310              | 331              | 351              |
|                      | Non-Public         | 9,712   | 300.19      | 37.50 | 250              | 279              | 302              | 325              | 346              |
| SWD                  | All Codes          | 27,679  | 273.81      | 37.61 | 218              | 250              | 275              | 299              | 321              |
| SUA                  | All Codes          | 16,295  | 274.49      | 38.72 | 218              | 250              | 275              | 302              | 323              |
| ELL                  | ELL=Y              | 14,264  | 275.66      | 34.90 | 226              | 256              | 279              | 299              | 317              |
| SWD/SUA              | SUA=504 plan codes | 13,203  | 269.23      | 37.59 | 218              | 244              | 268              | 295              | 317              |
| ELL/SUA              | SUA & ELL codes    | 1,577   | 261.49      | 32.05 | 218              | 236              | 265              | 284              | 302              |
| ELL Test Language    | Chinese            | 646     | 323.07      | 34.58 | 282              | 302              | 323              | 346              | 370              |
|                      | English            | 162,834 | 306.98      | 39.28 | 256              | 284              | 308              | 334              | 354              |
|                      | Haitian-Creole     | 71      | 259.30      | 35.81 | 210              | 226              | 265              | 287              | 299              |
|                      | Korean             | 57      | 327.70      | 39.81 | 279              | 302              | 327              | 357              | 370              |
|                      | Russian            | 88      | 289.50      | 38.03 | 236              | 263              | 294              | 318              | 343              |
|                      | Spanish            | 3,142   | 279.81      | 28.14 | 244              | 260              | 279              | 299              | 315              |
|                      | All Translations   | 4,004   | 287.32      | 34.32 | 244              | 265              | 284              | 308              | 331              |

#### 8.1.2.4. Mathematics Grade 6

Table 8.14 presents the Grade 6 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 304.67 with a standard deviation of 41.29. Female students tended to outperform male students by around 4 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students enrolled in Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (332.46). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, 0.85 standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed for English forms, scoring about 46 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (306): Female (308), Asian (335), Multiracial (312), Pacific Islander (312), and White (316) students, as well as those enrolled in Average (314) and Low (331) Needs districts and Charter schools (308). In terms of the 50th percentile ranks for students using translated forms, they ranged from: 270 (Spanish, n = 3,850) to 335 (Korean, n = 102).

**Table 8.14. Mathematics Grade 6 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 163,927 | 304.67      | 41.29 | 252              | 279              | 306              | 333              | 354              |
| Gender               | Female             | 80,342  | 306.80      | 39.27 | 259              | 284              | 308              | 333              | 354              |
|                      | Male               | 83,585  | 302.62      | 43.05 | 242              | 275              | 306              | 333              | 356              |
| Ethnicity            | Asian              | 18,008  | 332.46      | 39.25 | 284              | 308              | 335              | 359              | 379              |
|                      | Black              | 31,597  | 287.96      | 39.10 | 230              | 265              | 289              | 314              | 337              |
|                      | Hispanic           | 44,769  | 291.68      | 38.06 | 242              | 270              | 295              | 318              | 340              |
|                      | American Indian    | 1,093   | 295.51      | 38.38 | 242              | 275              | 297              | 320              | 343              |
|                      | Multiracial        | 2,539   | 311.22      | 42.86 | 259              | 286              | 312              | 343              | 365              |
|                      | Pacific Islander   | 459     | 310.71      | 40.66 | 259              | 289              | 312              | 337              | 359              |
|                      | White              | 65,462  | 313.83      | 38.21 | 265              | 292              | 316              | 340              | 359              |
| NRC                  | New York           | 65,092  | 302.78      | 43.06 | 242              | 275              | 304              | 333              | 359              |
|                      | Big 4 Cities       | 6,519   | 274.90      | 40.68 | 221              | 252              | 275              | 302              | 327              |
|                      | Urban/Suburban     | 10,538  | 284.47      | 39.10 | 230              | 259              | 286              | 312              | 333              |
|                      | Rural              | 7,807   | 299.04      | 36.98 | 252              | 279              | 302              | 324              | 343              |
|                      | Average Needs      | 33,188  | 310.42      | 36.95 | 265              | 289              | 314              | 335              | 354              |
|                      | Low Needs          | 16,783  | 329.17      | 34.03 | 286              | 310              | 331              | 351              | 368              |
|                      | Charter            | 10,470  | 306.73      | 36.97 | 259              | 286              | 308              | 331              | 351              |
|                      | Non-Public         | 13,427  | 300.81      | 38.66 | 252              | 279              | 304              | 325              | 345              |
| SWD                  | All Codes          | 26,243  | 269.39      | 37.65 | 221              | 242              | 270              | 295              | 316              |
| SUA                  | All Codes          | 16,464  | 273.24      | 38.99 | 221              | 252              | 275              | 300              | 322              |
| ELL                  | ELL=Y              | 14,017  | 269.05      | 38.21 | 213              | 242              | 270              | 295              | 316              |
| SWD/SUA              | SUA=504 plan codes | 13,327  | 268.13      | 37.65 | 213              | 242              | 270              | 292              | 314              |
| ELL/SUA              | SUA & ELL codes    | 1,668   | 258.60      | 33.36 | 213              | 230              | 259              | 284              | 300              |
| ELL Test Language    | Chinese            | 874     | 323.09      | 34.49 | 279              | 302              | 325              | 347              | 362              |
|                      | English            | 158,869 | 305.56      | 40.96 | 252              | 284              | 308              | 333              | 356              |
|                      | Haitian-Creole     | 89      | 269.02      | 35.87 | 213              | 242              | 270              | 297              | 316              |
|                      | Korean             | 102     | 330.10      | 37.74 | 275              | 308              | 335              | 351              | 368              |
|                      | Russian            | 143     | 292.36      | 44.82 | 230              | 259              | 292              | 320              | 345              |
|                      | Spanish            | 3,850   | 264.47      | 34.21 | 213              | 242              | 270              | 289              | 306              |
|                      | All Translations   | 5,058   | 276.79      | 41.89 | 221              | 252              | 275              | 304              | 331              |

**8.1.2.5. Mathematics Grade 7**

Table 8.15 presents the Grade 7 n-counts and scale score statistics for key demographic subgroups. The population scale score mean was 304.56 with a standard deviation of 39.80. Female students tended to outperform male students by around 4 scale score points. Asian, Multiracial, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students from Average and Low Needs districts and Charter schools. Across ethnic groups, Asian students earned the highest mean score (332.36). Across NRC



categories, students from Big 4 Cities districts earned the lowest mean score – by about three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, 0.87 standard deviations below the mean scale score for the population. English language learners tested under accommodations were the lowest-performing subgroup analyzed for English forms, scoring about 47 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (309): Female (310), Asian (337), Multiracial (313), Pacific Islander (312), and White (318) students, those enrolled in Average (313) and Low (331) Needs districts and Charter schools (312). In terms of the 50th percentile ranks for students using translated forms, they ranged from: 256 (Haitian-Creole, n = 83) to 336 (Korean, n = 89).

**Table 8.15. Mathematics Grade 7 Scale Score Distribution by Subgroup**

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students       | 151,897 | 304.56      | 39.80 | 244              | 280              | 309              | 333              | 352              |
| Gender               | Female             | 73,910  | 306.85      | 38.59 | 256              | 284              | 310              | 334              | 354              |
|                      | Male               | 77,987  | 302.38      | 40.79 | 244              | 276              | 305              | 331              | 352              |
| Ethnicity            | Asian              | 16,761  | 332.36      | 37.28 | 284              | 312              | 337              | 356              | 373              |
|                      | Black              | 30,239  | 287.87      | 37.85 | 236              | 265              | 290              | 315              | 336              |
|                      | Hispanic           | 41,983  | 292.68      | 36.99 | 236              | 271              | 295              | 318              | 337              |
|                      | American Indian    | 1,102   | 296.98      | 37.45 | 244              | 276              | 299              | 321              | 342              |
|                      | Multiracial        | 1,964   | 309.76      | 40.99 | 256              | 284              | 313              | 339              | 359              |
|                      | Pacific Islander   | 442     | 309.12      | 39.39 | 256              | 287              | 312              | 336              | 356              |
|                      | White              | 59,406  | 313.54      | 36.42 | 265              | 295              | 318              | 339              | 356              |
| NRC                  | New York           | 65,411  | 303.80      | 41.27 | 244              | 280              | 305              | 333              | 356              |
|                      | Big 4 Cities       | 5,993   | 273.16      | 38.85 | 220              | 244              | 276              | 299              | 324              |
|                      | Urban/Suburban     | 9,625   | 282.23      | 37.23 | 228              | 256              | 284              | 309              | 328              |
|                      | Rural              | 7,230   | 296.17      | 35.53 | 244              | 276              | 301              | 319              | 337              |
|                      | Average Needs      | 29,309  | 309.35      | 35.54 | 265              | 290              | 313              | 334              | 350              |
|                      | Low Needs          | 15,736  | 327.76      | 31.50 | 290              | 312              | 331              | 348              | 362              |
|                      | Charter            | 8,837   | 308.59      | 35.41 | 265              | 287              | 312              | 334              | 350              |
|                      | Non-Public         | 9,693   | 301.61      | 36.95 | 244              | 280              | 305              | 327              | 344              |
| SWD                  | All Codes          | 24,274  | 269.78      | 36.10 | 220              | 244              | 271              | 295              | 315              |
| SUA                  | All Codes          | 13,498  | 272.94      | 37.49 | 220              | 244              | 276              | 299              | 321              |
| ELL                  | ELL=Y              | 12,524  | 269.64      | 36.01 | 220              | 244              | 271              | 293              | 315              |
| SWD/SUA              | SUA=504 plan codes | 10,944  | 267.88      | 35.86 | 220              | 236              | 271              | 293              | 313              |
| ELL/SUA              | SUA & ELL codes    | 1,030   | 257.44      | 32.16 | 213              | 236              | 256              | 280              | 297              |

| Demographic Category |                  | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                  |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| ELL Test Language    | Chinese          | 857     | 324.48      | 33.93 | 284              | 307              | 330              | 346              | 362              |
|                      | English          | 147,216 | 305.41      | 39.45 | 244              | 280              | 309              | 333              | 354              |
|                      | Haitian-Creole   | 83      | 257.60      | 34.06 | 213              | 228              | 256              | 280              | 305              |
|                      | Korean           | 89      | 327.24      | 41.13 | 271              | 310              | 336              | 354              | 373              |
|                      | Russian          | 112     | 301.36      | 30.72 | 271              | 284              | 306              | 321              | 336              |
|                      | Spanish          | 3,540   | 264.87      | 32.98 | 220              | 236              | 271              | 287              | 305              |
|                      | All Translations | 4,681   | 277.71      | 41.23 | 220              | 244              | 276              | 305              | 334              |

#### 8.1.2.6. Mathematics Grade 8

Table 8.16 presents the Grade 8 scale score statistics and n-counts for key demographic subgroups. The population scale score mean was 292.72 with a standard deviation of 41.22. Female students tended to outperform male students by around 6 scale score points. Asian, Pacific Islander, and White students' scale score means exceeded the State mean scale score, as did those of students enrolled in New York City, Average and Low Needs districts and Charter and Non-Public schools. Across ethnic groups, Asian students earned the highest mean score (322.24). Across NRC categories, students from Big 4 Cities districts earned the lowest mean score – by three-quarters of a standard deviation below the population mean. The SWD, SUA, and ELL subgroups scored, on average, about three-quarters of a standard deviation below the mean scale score for the population. English language learners tested under accommodations were the lowest performing subgroup analyzed for English forms, scoring about 40 scale score points below the State mean. At the 50th percentile, the following groups exceeded that of the population (296): Female (299), Asian (325), Pacific Islander (306), and White (305) students, as well as those enrolled in Average (299) and Low (317) Needs districts and Charter (306) and Non-Public (303) schools. In terms of the 50th percentile ranks for students using translated forms, they ranged from: 266 (Spanish, n = 3,453) to 328 (Chinese, n = 777).

**Table 8.16. Mathematics Grade 8 Scale Score Distribution by Subgroup**

| Demographic Category |                  | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                  |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| State                | All Students     | 117,643 | 292.72      | 41.22 | 236              | 270              | 296              | 320              | 341              |
| Gender               | Female           | 56,305  | 295.66      | 39.80 | 236              | 274              | 299              | 322              | 343              |
|                      | Male             | 61,338  | 290.01      | 42.30 | 228              | 266              | 294              | 318              | 341              |
| Ethnicity            | Asian            | 11,241  | 322.24      | 40.82 | 270              | 299              | 325              | 350              | 369              |
|                      | Black            | 27,022  | 280.27      | 40.01 | 228              | 254              | 284              | 306              | 330              |
|                      | Hispanic         | 36,370  | 284.93      | 38.85 | 228              | 260              | 287              | 310              | 331              |
|                      | American Indian  | 786     | 282.50      | 40.15 | 228              | 260              | 284              | 310              | 330              |
|                      | Multiracial      | 1,223   | 291.98      | 42.14 | 228              | 266              | 296              | 320              | 341              |
|                      | Pacific Islander | 315     | 305.38      | 40.32 | 254              | 278              | 306              | 333              | 355              |
|                      | White            | 40,686  | 299.91      | 38.61 | 246              | 281              | 305              | 325              | 343              |

| Demographic Category |                    | N-Count | Scale Score |       | Percentile Ranks |                  |                  |                  |                  |
|----------------------|--------------------|---------|-------------|-------|------------------|------------------|------------------|------------------|------------------|
|                      |                    |         | Mean        | SD    | 10 <sup>th</sup> | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 90 <sup>th</sup> |
| NRC                  | New York           | 54,791  | 293.40      | 42.22 | 236              | 266              | 294              | 322              | 349              |
|                      | Big 4 Cities       | 5,353   | 262.01      | 41.50 | 212              | 228              | 260              | 292              | 317              |
|                      | Urban/Suburban     | 7,668   | 271.72      | 37.66 | 220              | 246              | 278              | 299              | 317              |
|                      | Rural              | 5,603   | 284.26      | 36.85 | 228              | 266              | 289              | 310              | 326              |
|                      | Average Needs      | 18,369  | 293.53      | 35.60 | 246              | 274              | 299              | 318              | 333              |
|                      | Low Needs          | 8,273   | 313.35      | 34.99 | 270              | 296              | 317              | 334              | 352              |
|                      | Charter            | 6,077   | 305.70      | 38.20 | 254              | 281              | 306              | 331              | 352              |
|                      | Non-Public         | 11,436  | 298.94      | 39.91 | 246              | 278              | 303              | 326              | 345              |
| SWD                  | All Codes          | 21,514  | 261.71      | 37.79 | 212              | 236              | 266              | 289              | 310              |
| SUA                  | All Codes          | 12,419  | 264.55      | 38.68 | 212              | 236              | 266              | 292              | 313              |
| ELL                  | ELL=Y              | 12,050  | 265.50      | 39.40 | 212              | 236              | 266              | 292              | 315              |
| SWD/SUA              | SUA=504 plan codes | 10,164  | 260.08      | 37.58 | 212              | 228              | 260              | 287              | 308              |
| ELL/SUA              | SUA & ELL codes    | 1,073   | 253.22      | 34.30 | 212              | 228              | 254              | 278              | 299              |
| ELL Test Language    | Chinese            | 777     | 325.60      | 34.79 | 284              | 306              | 328              | 350              | 364              |
|                      | English            | 113,151 | 293.41      | 40.98 | 236              | 270              | 296              | 320              | 341              |
|                      | Haitian-Creole     | 67      | 271.69      | 32.62 | 220              | 260              | 281              | 296              | 306              |
|                      | Korean             | 55      | 319.62      | 34.58 | 274              | 303              | 323              | 343              | 357              |
|                      | Russian            | 140     | 297.59      | 39.56 | 246              | 274              | 301              | 323              | 343              |
|                      | Spanish            | 3,453   | 262.36      | 35.89 | 212              | 236              | 266              | 289              | 306              |
|                      | All Translations   | 4,492   | 275.24      | 43.41 | 220              | 246              | 274              | 305              | 333              |

## 8.2. Performance Level Distribution Summary

Students are classified as NYS Level I, NYS Level II, NYS Level III, and NYS Level IV. The cut scores were established in 2013 during the standard-setting. Tables 6.13 and 6.14 show the ELA and Mathematics cut scores, respectively, used for classification of students into the four performance-level categories in 2016. It is inappropriate to compare scale scores across grades as they neither measure the same content, nor are they on the same scale. During the standard-setting process, while cut scores were set separately for different grades within a subject, additional care was taken to vertically articulate performance levels; see Section 8 and Appendix P in the 2013 technical report (NYSED, 2014) for details. While vertical articulation helps to build consistent meaning to the performance levels, the very nature of grade-specific content, differing performance expectations, and panel-set cut scores result in cut score differences across grades.

### 8.2.1. ELA Test Performance Level Distributions

Table 8.17 shows the performance level distribution for all examinees from public, charter, and non-public schools with valid ELA scores. Performance level data for selected subgroups of students were also examined. In general, these distributions reflect the same achievement trends in the scale score summary discussion. Across Tables 8.18 through 8.23, more Female students were classified in Level III and above categories than were Male students. Similarly, more Asian and White students were classified in Level III and above categories than were their peers from

other reported ethnic groups. Consistent with the pattern shown in scale score distribution across the subgroups, students from Low and Average Needs districts outperformed students from High Needs districts (New York City, Big 4 Cities, Urban/Suburban, and Rural). The Level III and above rates for students in the ELL, SWD, and SUA subgroups were low, compared to the total population of examinees.

**Table 8.17. ELA Test Performance Level Distributions**

| Grade | N-Count | Performance Levels |          |           |          |                |
|-------|---------|--------------------|----------|-----------|----------|----------------|
|       |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| 3     | 180,303 | 26.73              | 31.33    | 34.72     | 7.21     | 41.93          |
| 4     | 177,092 | 24.32              | 34.86    | 25.78     | 15.04    | 40.82          |
| 5     | 167,409 | 36.21              | 30.40    | 23.34     | 10.04    | 33.38          |
| 6     | 166,040 | 27.14              | 38.40    | 20.42     | 14.04    | 34.46          |
| 7     | 156,248 | 28.15              | 36.30    | 24.40     | 11.15    | 35.55          |
| 8     | 150,849 | 23.40              | 35.61    | 27.49     | 13.50    | 40.99          |

#### 8.2.1.1. ELA Grade 3

Table 8.18 presents the ELA Grade 3 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 41.93% of students achieved Level III and Level IV. About 47% of Female students were at Level III or above, as compared to 37% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (61%) students and students from Low Needs districts (66%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 18–32% of students in those same performance categories. Only about 9% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (42%), Female (47%), Asian (61%), Multiracial (46%), Pacific Islander (51%), White (50%) students, and those enrolled in Average (44%) and Low (66%) Needs districts and Charter (52%) schools.

**Table 8.18. ELA Grade 3 Performance Level Distribution by Subgroup**

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students     | 180,303 | 26.73              | 31.33    | 34.72     | 7.21     | 41.93          |
| Gender               | Female           | 89,264  | 22.31              | 30.90    | 37.51     | 9.27     | 46.78          |
|                      | Male             | 91,039  | 31.07              | 31.75    | 31.98     | 5.20     | 37.18          |
| Ethnicity            | Asian            | 18,237  | 13.52              | 25.04    | 46.23     | 15.21    | 61.44          |
|                      | Black            | 33,101  | 35.44              | 32.88    | 27.31     | 4.37     | 31.68          |
|                      | Hispanic         | 51,232  | 34.35              | 35.10    | 27.16     | 3.39     | 30.56          |
|                      | American Indian  | 1,243   | 31.13              | 34.19    | 29.53     | 5.15     | 34.67          |
|                      | Multiracial      | 4,476   | 25.40              | 28.87    | 36.68     | 9.05     | 45.73          |
|                      | Pacific Islander | 572     | 18.36              | 30.59    | 43.71     | 7.34     | 51.05          |
|                      | White            | 71,442  | 20.69              | 29.63    | 40.53     | 9.15     | 49.68          |

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| NRC                  | New York           | 71,067  | 27.30              | 31.81    | 33.18     | 7.71     | 40.89          |
|                      | Big 4 Cities       | 7,772   | 54.66              | 26.99    | 15.86     | 2.48     | 18.35          |
|                      | Urban/Suburban     | 13,931  | 40.33              | 34.29    | 23.03     | 2.35     | 25.38          |
|                      | Rural              | 9,662   | 35.10              | 34.34    | 27.31     | 3.25     | 30.56          |
|                      | Average Needs      | 40,068  | 23.50              | 32.74    | 37.13     | 6.63     | 43.76          |
|                      | Low Needs          | 17,567  | 9.72               | 24.59    | 52.09     | 13.60    | 65.69          |
|                      | Charter            | 10,275  | 17.27              | 30.83    | 42.49     | 9.41     | 51.90          |
|                      | Non-Public         | 9,927   | 26.61              | 30.98    | 35.61     | 6.80     | 42.41          |
| SWD                  | All Codes          | 26,905  | 65.45              | 23.37    | 10.34     | 0.84     | 11.18          |
| SUA                  | All Codes          | 12,231  | 68.68              | 21.92    | 8.72      | 0.68     | 9.40           |
| ELL                  | ELL=Y              | 16,854  | 64.32              | 28.05    | 7.38      | 0.25     | 7.63           |
| SWD/SUA              | SUA=504 plan codes | 9,998   | 74.94              | 18.48    | 6.23      | 0.34     | 6.57           |
| ELL/SUA              | SUA & ELL codes    | 1,122   | 83.87              | 13.10    | 2.76      | 0.27     | 3.03           |

#### 8.2.1.2. ELA Grade 4

Table 8.19 presents the ELA Grade 4 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 40.82% of students achieved Level III and Level IV. About 46% of Female students were at Level III or above, as compared to 36% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (62%) students and students from Low Needs districts (62%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 16–30% of students in those same performance categories. Only about 8% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (41%): Female (46%), Asian (62%), Multiracial (45%), Pacific Islander (50%), and White (47%) students as well as those enrolled in Average (42%) and Low (62%) Needs districts and Charter schools (49%).

**Table 8.19. ELA Grade 4 Performance Level Distribution by Subgroup**

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students     | 177,092 | 24.32              | 34.86    | 25.78     | 15.04    | 40.82          |
| Gender               | Female           | 87,333  | 20.18              | 34.03    | 27.71     | 18.08    | 45.79          |
|                      | Male             | 89,759  | 28.35              | 35.67    | 23.90     | 12.08    | 35.98          |
| Ethnicity            | Asian            | 17,770  | 11.38              | 26.51    | 31.87     | 30.24    | 62.11          |
|                      | Black            | 33,190  | 32.32              | 37.51    | 21.23     | 8.94     | 30.17          |
|                      | Hispanic         | 49,393  | 30.58              | 39.00    | 21.78     | 8.63     | 30.42          |
|                      | American Indian  | 1,122   | 27.81              | 35.56    | 24.33     | 12.30    | 36.63          |
|                      | Multiracial      | 3,809   | 23.21              | 31.87    | 25.70     | 19.22    | 44.92          |
|                      | Pacific Islander | 655     | 17.25              | 33.13    | 28.40     | 21.22    | 49.62          |
|                      | White            | 71,153  | 19.54              | 33.00    | 29.16     | 18.29    | 47.45          |

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| NRC                  | New York           | 69,462  | 23.55              | 35.02    | 24.95     | 16.47    | 41.43          |
|                      | Big 4 Cities       | 7,381   | 53.61              | 30.00    | 11.95     | 4.44     | 16.39          |
|                      | Urban/Suburban     | 13,219  | 38.66              | 38.14    | 17.85     | 5.35     | 23.19          |
|                      | Rural              | 9,168   | 33.96              | 38.03    | 20.51     | 7.50     | 28.01          |
|                      | Average Needs      | 38,012  | 21.98              | 35.86    | 27.73     | 14.43    | 42.16          |
|                      | Low Needs          | 16,999  | 9.24               | 28.38    | 35.56     | 26.83    | 62.39          |
|                      | Charter            | 8,703   | 15.49              | 35.96    | 31.71     | 16.83    | 48.55          |
|                      | Non-Public         | 14,148  | 23.01              | 35.93    | 27.23     | 13.82    | 41.05          |
| SWD                  | All Codes          | 27,602  | 61.77              | 28.33    | 7.71      | 2.18     | 9.90           |
| SUA                  | All Codes          | 13,680  | 63.95              | 26.67    | 7.39      | 1.99     | 9.38           |
| ELL                  | ELL=Y              | 15,118  | 61.85              | 31.85    | 5.60      | 0.71     | 6.30           |
| SWD/SUA              | SUA=504 plan codes | 10,555  | 72.78              | 21.42    | 4.78      | 1.01     | 5.80           |
| ELL/SUA              | SUA & ELL codes    | 1,148   | 84.15              | 14.81    | 0.96      | 0.09     | 1.05           |

### 8.2.1.3. ELA Grade 5

Table 8.20 presents the ELA Grade 5 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 33.38% of students achieved Level III and Level IV. About 39% of Female students were at Level III or above, as compared to 28% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (54%) students and students from Low Needs districts (53%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 14–23% of students in those same performance categories. Only about 5% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (33%): Female (39%), Asian (54%), Multiracial (37%), Pacific Islander (39%), and White (40%) students, as well as those enrolled in New York City (34%), Average (35%), and Low (53%) Needs districts and Charter schools (34%).

**Table 8.20. ELA Grade 5 Performance Level Distribution by Subgroup**

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students     | 167,409 | 36.21              | 30.40    | 23.34     | 10.04    | 33.38          |
| Gender               | Female           | 82,133  | 29.58              | 31.13    | 26.67     | 12.61    | 39.29          |
|                      | Male             | 85,276  | 42.60              | 29.70    | 20.13     | 7.56     | 27.70          |
| Ethnicity            | Asian            | 17,075  | 19.56              | 26.87    | 32.17     | 21.40    | 53.57          |
|                      | Black            | 32,270  | 46.30              | 30.62    | 18.00     | 5.08     | 23.08          |
|                      | Hispanic         | 46,573  | 45.35              | 31.58    | 17.95     | 5.12     | 23.07          |
|                      | American Indian  | 1,118   | 41.50              | 33.09    | 17.17     | 8.23     | 25.40          |
|                      | Multiracial      | 3,140   | 34.27              | 28.69    | 23.73     | 13.31    | 37.04          |
|                      | Pacific Islander | 475     | 26.95              | 34.11    | 26.53     | 12.42    | 38.95          |
|                      | White            | 66,758  | 29.29              | 30.39    | 27.49     | 12.83    | 40.32          |

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| NRC                  | New York           | 67,570  | 35.90              | 29.94    | 22.74     | 11.41    | 34.15          |
|                      | Big 4 Cities       | 6,751   | 65.26              | 21.02    | 10.64     | 3.08     | 13.72          |
|                      | Urban/Suburban     | 12,302  | 53.84              | 29.01    | 13.97     | 3.18     | 17.14          |
|                      | Rural              | 8,573   | 47.09              | 29.98    | 17.52     | 5.41     | 22.93          |
|                      | Average Needs      | 36,269  | 33.12              | 32.08    | 24.76     | 10.03    | 34.80          |
|                      | Low Needs          | 16,908  | 16.76              | 30.71    | 35.68     | 16.84    | 52.53          |
|                      | Charter            | 9,349   | 31.29              | 34.71    | 26.02     | 7.98     | 34.00          |
|                      | Non-Public         | 9,551   | 36.59              | 31.32    | 23.83     | 8.26     | 32.09          |
| SWD                  | All Codes          | 28,145  | 75.99              | 17.66    | 5.34      | 1.01     | 6.35           |
| SUA                  | All Codes          | 14,074  | 77.65              | 16.10    | 5.28      | 0.97     | 6.25           |
| ELL                  | ELL=Y              | 12,300  | 84.84              | 13.07    | 1.90      | 0.19     | 2.09           |
| SWD/SUA              | SUA=504 plan codes | 10,982  | 84.58              | 12.10    | 2.90      | 0.42     | 3.31           |
| ELL/SUA              | SUA & ELL codes    | 1,123   | 96.17              | 3.29     | 0.53      | --       | 0.53           |

#### 8.2.1.4. ELA Grade 6

Table 8.21 presents the ELA Grade 6 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 34.46% of students achieved Level III and Level IV. About 40% of Female students were at Level III or above, as compared to 29% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (58%) students and students from Low Needs districts (54%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 13–25% of students in those same performance categories. Only about 5% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (34%): Female (40%), Asian (58%), Multiracial (42%), Pacific Islander (43%), and White (41%) students, as well as those from New York City (35%), Average (36%) and Low (54%) Needs districts and Non-Public schools (35%).

**Table 8.21. ELA Grade 6 Performance Level Distribution by Subgroup**

| Demographic Category |              | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |              |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students | 166,040 | 27.14              | 38.40    | 20.42     | 14.04    | 34.46          |
| Gender               | Female       | 81,474  | 20.98              | 39.01    | 22.99     | 17.02    | 40.01          |
|                      | Male         | 84,566  | 33.08              | 37.82    | 17.95     | 11.16    | 29.10          |

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| Ethnicity            | Asian              | 17,545  | 12.38              | 30.08    | 26.70     | 30.84    | 57.54          |
|                      | Black              | 32,121  | 36.40              | 40.42    | 15.72     | 7.45     | 23.18          |
|                      | Hispanic           | 44,634  | 34.73              | 41.88    | 16.21     | 7.17     | 23.39          |
|                      | American Indian    | 1,137   | 33.69              | 41.07    | 16.09     | 9.15     | 25.24          |
|                      | Multiracial        | 2,672   | 25.37              | 32.71    | 22.19     | 19.72    | 41.92          |
|                      | Pacific Islander   | 450     | 17.78              | 39.33    | 22.44     | 20.44    | 42.89          |
|                      | White              | 67,481  | 21.57              | 37.48    | 23.79     | 17.15    | 40.95          |
| NRC                  | New York           | 63,916  | 27.18              | 38.09    | 19.48     | 15.25    | 34.73          |
|                      | Big 4 Cities       | 6,567   | 55.28              | 31.35    | 9.49      | 3.88     | 13.37          |
|                      | Urban/Suburban     | 11,045  | 43.84              | 37.19    | 13.00     | 5.97     | 18.97          |
|                      | Rural              | 8,286   | 34.79              | 39.85    | 16.75     | 8.60     | 25.36          |
|                      | Average Needs      | 35,060  | 25.10              | 39.15    | 21.69     | 14.06    | 35.75          |
|                      | Low Needs          | 17,152  | 11.33              | 34.96    | 29.31     | 24.40    | 53.71          |
|                      | Charter            | 10,479  | 22.82              | 44.98    | 22.03     | 10.17    | 32.21          |
|                      | Non-Public         | 13,424  | 23.76              | 40.81    | 22.59     | 12.84    | 35.43          |
| SWD                  | All Codes          | 27,171  | 66.49              | 27.42    | 4.80      | 1.29     | 6.09           |
| SUA                  | All Codes          | 13,910  | 66.11              | 26.50    | 5.61      | 1.78     | 7.39           |
| ELL                  | ELL=Y              | 12,212  | 73.69              | 23.79    | 2.16      | 0.36     | 2.52           |
| SWD/SUA              | SUA=504 plan codes | 10,623  | 74.40              | 21.54    | 3.32      | 0.73     | 4.06           |
| ELL/SUA              | SUA & ELL codes    | 1,035   | 88.12              | 11.79    | 0.10      | --       | 0.10           |

#### 8.2.1.5. ELA Grade 7

Table 8.22 presents the ELA Grade 7 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 35.55% of students achieved Level III and Level IV. About 43% of Female students were at Level III or above, as compared to 28% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (58%) students and students from Low Needs (56%) districts. The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 14–25% of students in those same performance categories. Only about 5% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (36%): Female (43%), Asian (58%), Multiracial (42%), Pacific Islander (38%), and White (43%) students, as well as those enrolled in Average (37%) and Low (56%) Needs districts and Non-Public schools (37%).



**Table 8.22. ELA Grade 7 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 156,248 | 28.15              | 36.30    | 24.40     | 11.15    | 35.55          |
| Gender               | Female             | 76,119  | 20.97              | 35.88    | 28.28     | 14.87    | 43.15          |
|                      | Male               | 80,129  | 34.97              | 36.70    | 20.72     | 7.61     | 28.33          |
| Ethnicity            | Asian              | 16,592  | 13.21              | 28.99    | 33.80     | 24.00    | 57.80          |
|                      | Black              | 31,224  | 37.23              | 39.71    | 18.18     | 4.88     | 23.06          |
|                      | Hispanic           | 42,218  | 35.03              | 40.25    | 19.17     | 5.55     | 24.72          |
|                      | American Indian    | 1,139   | 32.92              | 38.98    | 20.28     | 7.81     | 28.09          |
|                      | Multiracial        | 2,134   | 27.04              | 31.40    | 26.05     | 15.51    | 41.57          |
|                      | Pacific Islander   | 438     | 23.97              | 37.67    | 24.89     | 13.47    | 38.36          |
|                      | White              | 62,503  | 22.91              | 33.98    | 28.56     | 14.54    | 43.10          |
| NRC                  | New York           | 64,587  | 26.32              | 37.68    | 23.87     | 12.13    | 36.00          |
|                      | Big 4 Cities       | 6,230   | 57.19              | 29.15    | 11.03     | 2.63     | 13.66          |
|                      | Urban/Suburban     | 10,436  | 48.73              | 33.48    | 13.69     | 4.10     | 17.79          |
|                      | Rural              | 7,919   | 38.11              | 36.61    | 19.16     | 6.12     | 25.28          |
|                      | Average Needs      | 31,962  | 27.53              | 35.61    | 25.27     | 11.59    | 36.86          |
|                      | Low Needs          | 16,612  | 12.15              | 31.83    | 36.35     | 19.67    | 56.02          |
|                      | Charter            | 8,901   | 22.35              | 44.13    | 26.93     | 6.59     | 33.52          |
|                      | Non-Public         | 9,536   | 26.17              | 37.24    | 26.71     | 9.88     | 36.59          |
| SWD                  | All Codes          | 25,573  | 66.93              | 27.24    | 4.99      | 0.84     | 5.83           |
| SUA                  | All Codes          | 12,332  | 68.85              | 24.85    | 5.32      | 0.99     | 6.31           |
| ELL                  | ELL=Y              | 10,645  | 79.21              | 19.35    | 1.32      | 0.11     | 1.44           |
| SWD/SUA              | SUA=504 plan codes | 9,623   | 76.49              | 20.00    | 3.15      | 0.35     | 3.50           |
| ELL/SUA              | SUA & ELL codes    | 798     | 90.85              | 8.65     | 0.50      | --       | 0.50           |

**8.2.1.6. ELA Grade 8**

Table 8.23 presents the ELA Grade 8 performance level distributions and n-counts of demographic subgroups. Statewide, a combined 40.99% of students achieved Level III and Level IV. About 48% of Female students were at Level III or above, as compared to 34% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (64%) students and students from Low Needs (64%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 16–31% of students in those same performance categories. Only about 6% of the SWD, SUA, and ELL subgroups on average earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (41%): Female (48%), Asian (64%), Multiracial (42%), Pacific Islander (52%), and White (49%) students, as well as those attending Average (43%) and Low (64%) Needs districts and Charter (42%) and Non-Public (43%) schools.

**Table 8.23. ELA Grade 8 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 150,849 | 23.40              | 35.61    | 27.49     | 13.50    | 40.99          |
| Gender               | Female             | 73,329  | 17.34              | 34.57    | 30.79     | 17.30    | 48.09          |
|                      | Male               | 77,520  | 29.13              | 36.60    | 24.37     | 9.90     | 34.27          |
| Ethnicity            | Asian              | 16,338  | 11.03              | 25.30    | 35.31     | 28.36    | 63.67          |
|                      | Black              | 31,832  | 30.35              | 41.06    | 22.29     | 6.30     | 28.58          |
|                      | Hispanic           | 41,398  | 28.46              | 41.05    | 23.45     | 7.04     | 30.49          |
|                      | American Indian    | 992     | 31.96              | 38.61    | 20.56     | 8.87     | 29.44          |
|                      | Multiracial        | 1,731   | 25.30              | 33.04    | 26.05     | 15.60    | 41.65          |
|                      | Pacific Islander   | 397     | 16.37              | 31.74    | 33.50     | 18.39    | 51.89          |
|                      | White              | 58,161  | 19.31              | 31.71    | 31.14     | 17.84    | 48.98          |
| NRC                  | New York           | 64,523  | 22.11              | 37.38    | 27.04     | 13.47    | 40.51          |
|                      | Big 4 Cities       | 5,959   | 53.35              | 30.17    | 12.52     | 3.96     | 16.48          |
|                      | Urban/Suburban     | 9,608   | 38.38              | 37.90    | 18.18     | 5.54     | 23.72          |
|                      | Rural              | 7,445   | 31.42              | 37.21    | 23.16     | 8.22     | 31.38          |
|                      | Average Needs      | 28,769  | 23.59              | 33.77    | 28.02     | 14.62    | 42.64          |
|                      | Low Needs          | 15,112  | 10.02              | 26.40    | 37.58     | 26.01    | 63.59          |
|                      | Charter            | 7,442   | 14.79              | 43.47    | 31.55     | 10.19    | 41.74          |
|                      | Non-Public         | 11,925  | 20.18              | 37.22    | 31.03     | 11.58    | 42.61          |
| SWD                  | All Codes          | 23,974  | 59.74              | 32.42    | 6.82      | 1.02     | 7.85           |
| SUA                  | All Codes          | 11,509  | 61.95              | 29.13    | 7.44      | 1.48     | 8.91           |
| ELL                  | ELL=Y              | 10,518  | 74.48              | 23.19    | 2.22      | 0.10     | 2.33           |
| SWD/SUA              | SUA=504 plan codes | 8,921   | 69.49              | 25.73    | 4.16      | 0.63     | 4.79           |
| ELL/SUA              | SUA & ELL codes    | 672     | 87.20              | 12.80    | --        | --       | --             |

**8.2.2. Mathematics Test Performance Level Distributions**

Table 8.24 shows the performance level distributions for all examinees from public, charter, and non-public schools with valid scores, and presents mathematics performance level data for total populations of students in Grades 3–8. Performance level data for selected subgroups of students were also examined. In general, these summaries reflect the same achievement trends as in the scale score summary discussion. Across Table 8.25 through Table 8.30, Male and Female students performed similarly across grades. More White, Pacific Islander, and Asian students were classified in Level III and above, as compared to their peers from other ethnic subgroups. Students from Low and Average Needs districts and Charter schools outperformed students from High Needs districts (New York City, Big 4 Cities, High Needs Urban/Suburban, and High Needs Rural), and Non-Public schools. The subgroups that used the Korean or Chinese translations outperformed other test translation subgroups. The Level III and above rates for SWD and SUA subgroups were low, compared to the total population of examinees. The n-counts for the Haitian-Creole, Korean, and Russian translation subgroups were very low, and the results might have been heavily influenced by very high and/or very low achieving individual students.

**Table 8.24. Mathematics Test Performance Level Distributions**

| Grade | N-Count | Performance Levels |          |           |          |                |
|-------|---------|--------------------|----------|-----------|----------|----------------|
|       |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| 3     | 180,824 | 25.41              | 30.88    | 22.02     | 21.69    | 43.71          |
| 4     | 177,147 | 27.63              | 28.12    | 23.44     | 20.80    | 44.25          |
| 5     | 166,838 | 32.29              | 28.03    | 23.86     | 15.81    | 39.67          |
| 6     | 163,927 | 25.88              | 34.43    | 18.56     | 21.14    | 39.70          |
| 7     | 151,897 | 33.76              | 30.72    | 21.94     | 13.57    | 35.51          |
| 8     | 117,643 | 39.09              | 36.58    | 16.21     | 8.12     | 24.33          |

**8.2.2.1. Mathematics Grade 3**

Table 8.25 presents the Mathematics Grade 3 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 43.71% of students achieved Level III and Level IV. About 43% of both Female and Male students were at Level III or above. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (68%) students and students from Low Needs (66%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 20–38% of students in those same performance categories. Only about 15% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (44%): Asian (68%), Multiracial (48%), Pacific Islander (55%), and White (53%) students, as well as those enrolled at Average (48%) and Low (66%) Needs districts and Charter schools (59%). For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 10% (Haitian-Creole) to 76% (Korean).

**Table 8.25. Mathematics Grade 3 Performance Level Distribution by Subgroup**

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students     | 180,824 | 25.41              | 30.88    | 22.02     | 21.69    | 43.71          |
| Gender               | Female           | 89,256  | 24.50              | 32.04    | 22.44     | 21.03    | 43.46          |
|                      | Male             | 91,568  | 26.31              | 29.75    | 21.61     | 22.34    | 43.95          |
| Ethnicity            | Asian            | 18,846  | 9.83               | 22.21    | 25.47     | 42.49    | 67.97          |
|                      | Black            | 33,026  | 37.30              | 32.75    | 16.80     | 13.15    | 29.95          |
|                      | Hispanic         | 51,784  | 34.06              | 35.26    | 18.75     | 11.93    | 30.68          |
|                      | American Indian  | 1,256   | 30.25              | 34.47    | 19.75     | 15.53    | 35.27          |
|                      | Multiracial      | 4,378   | 23.00              | 29.21    | 22.89     | 24.90    | 47.78          |
|                      | Pacific Islander | 585     | 17.26              | 27.86    | 28.03     | 26.84    | 54.87          |
|                      | White            | 70,949  | 17.83              | 29.18    | 25.85     | 27.14    | 52.99          |

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| NRC                  | New York           | 72,428  | 27.19              | 31.80    | 20.79     | 20.22    | 41.01          |
|                      | Big 4 Cities       | 7,883   | 53.08              | 27.25    | 11.76     | 7.92     | 19.68          |
|                      | Urban/Suburban     | 13,862  | 38.65              | 33.67    | 16.99     | 10.68    | 27.67          |
|                      | Rural              | 9,484   | 28.17              | 33.58    | 21.55     | 16.69    | 38.24          |
|                      | Average Needs      | 39,280  | 20.58              | 31.25    | 25.05     | 23.13    | 48.18          |
|                      | Low Needs          | 17,480  | 9.36               | 24.69    | 28.32     | 37.63    | 65.95          |
|                      | Charter            | 10,295  | 14.19              | 27.14    | 24.27     | 34.40    | 58.67          |
|                      | Non-Public         | 10,078  | 28.38              | 33.85    | 21.17     | 16.60    | 37.78          |
| SWD                  | All Codes          | 26,877  | 56.29              | 27.62    | 10.30     | 5.80     | 16.10          |
| SUA                  | All Codes          | 12,655  | 58.94              | 26.73    | 9.58      | 4.75     | 14.33          |
| ELL                  | ELL=Y              | 18,934  | 54.24              | 30.17    | 10.36     | 5.23     | 15.59          |
| SWD_SUA              | SUA=504 plan codes | 10,505  | 63.87              | 24.47    | 8.14      | 3.51     | 11.65          |
| ELL_SUA              | SUA & ELL codes    | 1,291   | 71.73              | 20.06    | 5.65      | 2.56     | 8.21           |
| ELL Test Language    | Chinese            | 783     | 8.68               | 26.95    | 27.97     | 36.40    | 64.37          |
|                      | English            | 176,525 | 24.83              | 30.96    | 22.23     | 21.98    | 44.21          |
|                      | Haitian-Creole     | 86      | 62.79              | 26.74    | 6.98      | 3.49     | 10.47          |
|                      | Korean             | 46      | 17.39              | 6.52     | 39.13     | 36.96    | 76.09          |
|                      | Russian            | 103     | 41.75              | 33.98    | 11.65     | 12.62    | 24.27          |
|                      | Spanish            | 3,281   | 59.22              | 27.98    | 9.48      | 3.32     | 12.80          |
|                      | All Translations   | 4,299   | 49.22              | 27.68    | 13.17     | 9.93     | 23.10          |

#### 8.2.2.2. Mathematics Grade 4

Table 8.26 presents the Mathematics Grade 4 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 44.25% of students achieved Level III and Level IV. About 44% of both Female and Male students were at Level III or above. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (71%) students and students from Low Needs (70%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 18–38% of students in those same performance categories. Only about 14% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (44%): Asian (71%), Multiracial (49%), Pacific Islander (51%), and White (54%) students, as well as students enrolled in Average (50%) and Low (70%) Needs and Charter schools (55%). For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 5% (Haitian-Creole) to 64% (Chinese).

**Table 8.26. Mathematics Grade 4 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 177,147 | 27.63              | 28.12    | 23.44     | 20.80    | 44.25          |
| Gender               | Female             | 87,170  | 27.05              | 28.88    | 23.77     | 20.30    | 44.07          |
|                      | Male               | 89,977  | 28.20              | 27.38    | 23.13     | 21.29    | 44.42          |
| Ethnicity            | Asian              | 18,312  | 10.71              | 18.76    | 25.85     | 44.68    | 70.53          |
|                      | Black              | 33,016  | 41.90              | 29.92    | 17.03     | 11.14    | 28.17          |
|                      | Hispanic           | 49,917  | 37.34              | 31.59    | 19.52     | 11.55    | 31.07          |
|                      | American Indian    | 1,124   | 32.30              | 30.34    | 19.48     | 17.88    | 37.37          |
|                      | Multiracial        | 3,710   | 24.91              | 26.31    | 24.42     | 24.37    | 48.79          |
|                      | Pacific Islander   | 667     | 20.84              | 28.49    | 25.04     | 25.64    | 50.67          |
|                      | White              | 70,401  | 18.59              | 27.30    | 28.61     | 25.50    | 54.10          |
| NRC                  | New York           | 70,714  | 30.68              | 27.91    | 20.66     | 20.75    | 41.41          |
|                      | Big 4 Cities       | 7,428   | 57.12              | 24.77    | 12.16     | 5.95     | 18.11          |
|                      | Urban/Suburban     | 12,988  | 43.25              | 30.06    | 17.89     | 8.80     | 26.69          |
|                      | Rural              | 8,959   | 29.46              | 32.25    | 24.76     | 13.54    | 38.30          |
|                      | Average Needs      | 37,253  | 20.56              | 29.22    | 28.18     | 22.03    | 50.21          |
|                      | Low Needs          | 17,085  | 8.94               | 21.36    | 31.98     | 37.73    | 69.70          |
|                      | Charter            | 8,731   | 17.90              | 27.39    | 25.52     | 29.19    | 54.71          |
|                      | Non-Public         | 13,989  | 28.64              | 32.28    | 23.52     | 15.56    | 39.08          |
| SWD                  | All Codes          | 27,416  | 61.84              | 23.82    | 9.59      | 4.75     | 14.34          |
| SUA                  | All Codes          | 16,683  | 60.34              | 24.47    | 10.75     | 4.43     | 15.18          |
| ELL                  | ELL=Y              | 17,115  | 60.14              | 25.91    | 9.65      | 4.30     | 13.95          |
| SWD_SUA              | SUA=504 plan codes | 13,524  | 66.31              | 22.17    | 8.39      | 3.14     | 11.52          |
| ELL_SUA              | SUA & ELL codes    | 1,645   | 77.20              | 17.93    | 4.07      | 0.79     | 4.86           |
| ELL Test Language    | Chinese            | 736     | 12.09              | 24.32    | 29.62     | 33.97    | 63.59          |
|                      | English            | 172,935 | 26.96              | 28.23    | 23.72     | 21.09    | 44.81          |
|                      | Haitian-Creole     | 88      | 71.59              | 23.86    | 4.55      | .        | 4.55           |
|                      | Korean             | 67      | 23.88              | 16.42    | 25.37     | 34.33    | 59.70          |
|                      | Russian            | 121     | 31.40              | 37.19    | 19.01     | 12.40    | 31.40          |
|                      | Spanish            | 3,200   | 66.59              | 22.97    | 7.84      | 2.59     | 10.44          |
|                      | All Translations   | 4,212   | 55.48              | 23.53    | 12.18     | 8.81     | 20.99          |

**8.2.2.3. Mathematics Grade 5**

Table 8.27 presents the Mathematics Grade 5 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 39.67% of students achieved Level III and Level IV. About 39% of Female students were at Level III or above, as compared to 40% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (68%) students and students from Low Needs districts (65%). The Big 4

Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 16–32% of students in those same performance categories. Only about 11% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (40%): Asian (68%), Multiracial (44%), Pacific Islander (45%), and White (50%) students, as well as those enrolled in Average (46%) and Low (65%) Needs districts and Charter schools (41%). For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 3% (Haitian-Creole) to 60% (Korean).

**Table 8.27. Mathematics Grade 5 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 166,838 | 32.29              | 28.03    | 23.86     | 15.81    | 39.67          |
| Gender               | Female             | 81,693  | 31.29              | 29.85    | 24.45     | 14.40    | 38.86          |
|                      | Male               | 85,145  | 33.25              | 26.29    | 23.30     | 17.16    | 40.46          |
| Ethnicity            | Asian              | 17,581  | 12.14              | 20.12    | 29.96     | 37.77    | 67.73          |
|                      | Black              | 31,935  | 47.89              | 29.41    | 16.78     | 5.91     | 22.70          |
|                      | Hispanic           | 47,015  | 41.85              | 31.90    | 18.86     | 7.39     | 26.24          |
|                      | American Indian    | 1,128   | 42.02              | 27.39    | 19.95     | 10.64    | 30.59          |
|                      | Multiracial        | 3,045   | 31.66              | 24.70    | 23.65     | 20.00    | 43.65          |
|                      | Pacific Islander   | 491     | 25.87              | 29.53    | 25.66     | 18.94    | 44.60          |
|                      | White              | 65,643  | 23.16              | 26.87    | 29.33     | 20.65    | 49.97          |
| NRC                  | New York           | 68,735  | 34.02              | 28.44    | 21.77     | 15.78    | 37.54          |
|                      | Big 4 Cities       | 6,763   | 63.43              | 20.91    | 10.13     | 5.53     | 15.66          |
|                      | Urban/Suburban     | 12,030  | 49.49              | 28.68    | 16.39     | 5.44     | 21.83          |
|                      | Rural              | 8,240   | 37.49              | 30.45    | 22.57     | 9.49     | 32.06          |
|                      | Average Needs      | 35,106  | 25.52              | 28.71    | 28.45     | 17.32    | 45.77          |
|                      | Low Needs          | 16,744  | 11.34              | 23.20    | 33.83     | 31.62    | 65.46          |
|                      | Charter            | 9,370   | 28.67              | 30.78    | 26.52     | 14.03    | 40.55          |
|                      | Non-Public         | 9,712   | 37.06              | 30.59    | 22.15     | 10.20    | 32.35          |
| SWD                  | All Codes          | 27,679  | 66.86              | 21.63    | 8.74      | 2.77     | 11.51          |
| SUA                  | All Codes          | 16,295  | 66.13              | 20.90    | 9.59      | 3.38     | 12.97          |
| ELL                  | ELL=Y              | 14,264  | 66.90              | 23.16    | 7.45      | 2.50     | 9.95           |
| SWD_SUA              | SUA=504 plan codes | 13,203  | 71.59              | 18.80    | 7.39      | 2.22     | 9.61           |
| ELL_SUA              | SUA & ELL codes    | 1,577   | 82.75              | 14.27    | 2.54      | 0.44     | 2.98           |
| ELL Test Language    | Chinese            | 646     | 16.10              | 26.16    | 31.73     | 26.01    | 57.74          |
|                      | English            | 162,834 | 31.68              | 28.10    | 24.16     | 16.05    | 40.22          |
|                      | Haitian-Creole     | 71      | 81.69              | 15.49    | 1.41      | 1.41     | 2.82           |
|                      | Korean             | 57      | 14.04              | 26.32    | 24.56     | 35.09    | 59.65          |
|                      | Russian            | 88      | 48.86              | 26.14    | 15.91     | 9.09     | 25.00          |
|                      | Spanish            | 3,142   | 65.98              | 25.21    | 7.57      | 1.24     | 8.82           |
|                      | All Translations   | 4,004   | 57.09              | 25.22    | 11.79     | 5.89     | 17.68          |

#### 8.2.2.4. Mathematics Grade 6

Table 8.28 presents the Mathematics Grade 6 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 39.70% of students achieved Level III and Level IV. About 41% of Female students were at Level III or above, as compared to 39% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (68%) students and students from Low Needs districts (68%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 15–32% of students in those same performance categories. Only about 10% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (40%): Female (41%), Asian (68%), Multiracial (46%), Pacific Islander (44%), and White (50%) students, as well as those enrolled in Average (46%) and Low (68%) Needs districts and Charter schools (41%). For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 8% (Haitian-Creole) to 72% (Korean).

**Table 8.28. Mathematics Grade 6 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 163,927 | 25.88              | 34.43    | 18.56     | 21.14    | 39.70          |
| Gender               | Female             | 80,342  | 23.29              | 35.80    | 19.70     | 21.22    | 40.92          |
|                      | Male               | 83,585  | 28.37              | 33.11    | 17.45     | 21.07    | 38.52          |
| Ethnicity            | Asian              | 18,008  | 9.57               | 22.01    | 20.61     | 47.81    | 68.42          |
|                      | Black              | 31,597  | 40.03              | 37.28    | 13.33     | 9.36     | 22.70          |
|                      | Hispanic           | 44,769  | 35.63              | 39.27    | 14.82     | 10.27    | 25.10          |
|                      | American Indian    | 1,093   | 30.92              | 40.99    | 16.01     | 12.08    | 28.09          |
|                      | Multiracial        | 2,539   | 22.10              | 31.82    | 18.16     | 27.92    | 46.08          |
|                      | Pacific Islander   | 459     | 17.21              | 38.56    | 19.61     | 24.62    | 44.23          |
|                      | White              | 65,462  | 16.99              | 33.11    | 23.11     | 26.78    | 49.89          |
| NRC                  | New York           | 65,092  | 29.03              | 34.11    | 15.77     | 21.09    | 36.87          |
|                      | Big 4 Cities       | 6,519   | 54.38              | 30.80    | 9.04      | 5.78     | 14.82          |
|                      | Urban/Suburban     | 10,538  | 43.79              | 35.82    | 12.74     | 7.64     | 20.38          |
|                      | Rural              | 7,807   | 27.00              | 41.00    | 18.75     | 13.24    | 32.00          |
|                      | Average Needs      | 33,188  | 18.59              | 35.81    | 22.86     | 22.74    | 45.60          |
|                      | Low Needs          | 16,783  | 7.76               | 24.70    | 25.79     | 41.76    | 67.54          |
|                      | Charter            | 10,470  | 22.18              | 37.33    | 20.63     | 19.87    | 40.50          |
|                      | Non-Public         | 13,427  | 25.75              | 39.33    | 19.78     | 15.14    | 34.92          |
| SWD                  | All Codes          | 26,243  | 61.16              | 29.40    | 6.15      | 3.30     | 9.45           |
| SUA                  | All Codes          | 16,464  | 56.52              | 31.13    | 7.85      | 4.50     | 12.35          |
| ELL                  | ELL=Y              | 14,017  | 61.07              | 29.46    | 5.86      | 3.61     | 9.47           |
| SWD_SUA              | SUA=504 plan codes | 13,327  | 62.42              | 28.58    | 6.04      | 2.96     | 9.00           |
| ELL_SUA              | SUA & ELL codes    | 1,668   | 74.10              | 22.66    | 2.70      | 0.54     | 3.24           |

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| ELL Test Language    | Chinese          | 874     | 11.78              | 28.60    | 23.91     | 35.70    | 59.61          |
|                      | English          | 158,869 | 24.98              | 34.58    | 18.89     | 21.56    | 40.44          |
|                      | Haitian-Creole   | 89      | 59.55              | 32.58    | 7.87      | .        | 7.87           |
|                      | Korean           | 102     | 12.75              | 15.69    | 27.45     | 44.12    | 71.57          |
|                      | Russian          | 143     | 40.56              | 31.47    | 12.59     | 15.38    | 27.97          |
|                      | Spanish          | 3,850   | 65.40              | 29.92    | 3.92      | 0.75     | 4.68           |
|                      | All Translations | 5,058   | 54.27              | 29.50    | 8.17      | 8.07     | 16.23          |

#### 8.2.2.5. Mathematics Grade 7

Table 8.29 presents the Mathematics Grade 7 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 35.51% of students achieved Level III and Level IV. About 37% of Female students were at Level III or above, as compared to 34% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (66%) students and students from Low Needs districts (64%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 11–23% of students in those same performance categories. Only about 7% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (36%): Female (37%), Asian (66%), Multiracial (42%), Pacific Islander (40%), and White (45%) students, as well as those enrolled in Average (40%) and Low (64%) Needs districts and Charter schools (39%). For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 2% (Haitian-Creole) to 63% (Korean).

**Table 8.29. Mathematics Grade 7 Performance Level Distribution by Subgroup**

| Demographic Category |                  | N-Count | Performance Levels |          |           |          |                |
|----------------------|------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                  |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students     | 151,897 | 33.76              | 30.72    | 21.94     | 13.57    | 35.51          |
| Gender               | Female           | 73,910  | 31.09              | 31.90    | 22.96     | 14.05    | 37.01          |
|                      | Male             | 77,987  | 36.30              | 29.61    | 20.97     | 13.12    | 34.10          |
| Ethnicity            | Asian            | 16,761  | 12.73              | 20.92    | 28.73     | 37.62    | 66.35          |
|                      | Black            | 30,239  | 50.84              | 30.34    | 13.90     | 4.91     | 18.81          |
|                      | Hispanic         | 41,983  | 45.18              | 33.03    | 15.94     | 5.85     | 21.79          |
|                      | American Indian  | 1,102   | 41.83              | 33.30    | 17.06     | 7.80     | 24.86          |
|                      | Multiracial      | 1,964   | 29.38              | 28.46    | 23.83     | 18.33    | 42.16          |
|                      | Pacific Islander | 442     | 27.83              | 31.90    | 24.66     | 15.61    | 40.27          |
|                      | White            | 59,406  | 22.97              | 32.07    | 28.36     | 16.60    | 44.96          |



| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| NRC                  | New York           | 65,411  | 36.57              | 29.39    | 18.90     | 15.14    | 34.04          |
|                      | Big 4 Cities       | 5,993   | 67.15              | 21.94    | 8.31      | 2.60     | 10.91          |
|                      | Urban/Suburban     | 9,625   | 56.82              | 28.88    | 11.36     | 2.94     | 14.30          |
|                      | Rural              | 7,230   | 38.71              | 38.15    | 17.93     | 5.21     | 23.14          |
|                      | Average Needs      | 29,309  | 25.79              | 34.55    | 27.30     | 12.36    | 39.66          |
|                      | Low Needs          | 15,736  | 10.63              | 25.74    | 36.50     | 27.13    | 63.63          |
|                      | Charter            | 8,837   | 28.38              | 33.03    | 25.86     | 12.73    | 38.59          |
|                      | Non-Public         | 9,693   | 34.26              | 35.83    | 20.91     | 9.00     | 29.91          |
| SWD                  | All Codes          | 24,274  | 71.97              | 21.06    | 5.41      | 1.56     | 6.97           |
| SUA                  | All Codes          | 13,498  | 67.68              | 22.91    | 7.22      | 2.19     | 9.41           |
| ELL                  | ELL=Y              | 12,524  | 72.91              | 19.80    | 5.56      | 1.73     | 7.29           |
| SWD_SUA              | SUA=504 plan codes | 10,944  | 73.61              | 20.11    | 5.03      | 1.24     | 6.28           |
| ELL_SUA              | SUA & ELL codes    | 1,030   | 86.21              | 11.65    | 1.94      | 0.19     | 2.14           |
| ELL Test Language    | Chinese            | 857     | 14.35              | 26.02    | 35.59     | 24.04    | 59.63          |
|                      | English            | 147,216 | 32.79              | 31.05    | 22.33     | 13.83    | 36.16          |
|                      | Haitian-Creole     | 83      | 81.93              | 15.66    | 2.41      | .        | 2.41           |
|                      | Korean             | 89      | 15.73              | 21.35    | 29.21     | 33.71    | 62.92          |
|                      | Russian            | 112     | 33.93              | 42.86    | 17.86     | 5.36     | 23.21          |
|                      | Spanish            | 3,540   | 78.31              | 18.25    | 3.02      | 0.42     | 3.45           |
|                      | All Translations   | 4,681   | 64.41              | 20.27    | 9.83      | 5.49     | 15.32          |

#### 8.2.2.6. Mathematics Grade 8

Table 8.30 presents the Mathematics Grade 8 performance level summaries and n-counts of demographic subgroups. Statewide, a combined 24.33% of students achieved Level III and Level IV. About 26% of Female students were at Level III or above, as compared to 23% of Male students. The percentage of students in Levels III and IV varied widely by ethnicity and NRC subgroup. The ethnicity and NRC category with the greatest percentages of students at Level III and above were Asian (54%) students and students from Low Needs districts (44%). The Big 4 Cities, High Needs/Urban/Suburban, Black, and Hispanic students had a range of 8–17% of students in those same performance categories. Only about 6% of the SWD, SUA, and ELL subgroups, on average, earned at least a Level III. Each of the following subgroups had a higher percentage of students in Levels III and IV than statewide (24%): Female (26%), Asian (54%), Pacific Islander (37%), and White (30%) students, as well as those enrolled in New York City (25%) and Low Needs districts (44%) and Charter (35%) and Non-Public (30%) schools. For ELL students who used translated test forms, the percentages of students earning at least a Level III ranged from 1% (Haitian-Creole) to 58% (Korean).

**Table 8.30. Mathematics Grade 8 Performance Level Distribution by Subgroup**

| Demographic Category |                    | N-Count | Performance Levels |          |           |          |                |
|----------------------|--------------------|---------|--------------------|----------|-----------|----------|----------------|
|                      |                    |         | Level I            | Level II | Level III | Level IV | Level III & IV |
| State                | All Students       | 117,643 | 39.09              | 36.58    | 16.21     | 8.12     | 24.33          |
| Gender               | Female             | 56,305  | 36.00              | 38.35    | 17.04     | 8.62     | 25.65          |
|                      | Male               | 61,338  | 41.93              | 34.95    | 15.45     | 7.67     | 23.12          |
| Ethnicity            | Asian              | 11,241  | 16.47              | 29.09    | 25.97     | 28.48    | 54.44          |
|                      | Black              | 27,022  | 52.55              | 32.96    | 10.29     | 4.20     | 14.49          |
|                      | Hispanic           | 36,370  | 47.16              | 36.26    | 12.12     | 4.47     | 16.59          |
|                      | American Indian    | 786     | 50.64              | 33.46    | 11.83     | 4.07     | 15.90          |
|                      | Multiracial        | 1,223   | 39.25              | 36.79    | 16.43     | 7.52     | 23.96          |
|                      | Pacific Islander   | 315     | 31.11              | 32.06    | 21.90     | 14.92    | 36.83          |
|                      | White              | 40,686  | 29.03              | 41.42    | 21.14     | 8.41     | 29.55          |
| NRC                  | New York           | 54,791  | 40.57              | 34.40    | 14.96     | 10.07    | 25.03          |
|                      | Big 4 Cities       | 5,353   | 70.76              | 20.90    | 5.88      | 2.45     | 8.33           |
|                      | Urban/Suburban     | 7,668   | 60.33              | 32.04    | 6.47      | 1.16     | 7.63           |
|                      | Rural              | 5,603   | 44.57              | 41.66    | 11.76     | 2.02     | 13.78          |
|                      | Average Needs      | 18,369  | 33.65              | 45.15    | 17.82     | 3.38     | 21.20          |
|                      | Low Needs          | 8,273   | 16.55              | 39.08    | 30.55     | 13.83    | 44.37          |
|                      | Charter            | 6,077   | 27.71              | 37.06    | 21.70     | 13.53    | 35.23          |
|                      | Non-Public         | 11,436  | 31.31              | 39.11    | 19.83     | 9.74     | 29.57          |
| SWD                  | All Codes          | 21,514  | 72.46              | 22.26    | 4.28      | 1.01     | 5.29           |
| SUA                  | All Codes          | 12,419  | 68.93              | 24.57    | 5.22      | 1.28     | 6.50           |
| ELL                  | ELL=Y              | 12,050  | 68.74              | 23.43    | 5.65      | 2.18     | 7.83           |
| SWD_SUA              | SUA=504 plan codes | 10,164  | 73.77              | 21.64    | 3.71      | 0.89     | 4.59           |
| ELL_SUA              | SUA & ELL codes    | 1,073   | 83.69              | 14.17    | 1.30      | 0.84     | 2.14           |
| ELL Test Language    | Chinese            | 777     | 10.04              | 32.18    | 29.73     | 28.06    | 57.79          |
|                      | English            | 113,151 | 38.29              | 36.99    | 16.51     | 8.21     | 24.72          |
|                      | Haitian-Creole     | 67      | 59.70              | 38.81    | .         | 1.49     | 1.49           |
|                      | Korean             | 55      | 12.73              | 29.09    | 38.18     | 20.00    | 58.18          |
|                      | Russian            | 140     | 34.29              | 38.57    | 19.29     | 7.86     | 27.14          |
|                      | Spanish            | 3,453   | 72.17              | 24.04    | 3.07      | 0.72     | 3.79           |
|                      | All Translations   | 4,492   | 59.33              | 26.18    | 8.57      | 5.92     | 14.49          |

## Section 9: References

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## Appendix A: ELA and Mathematics Test Configurations

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Table A1. ELA Test Configuration

| Grade | Day    Book |   | Number of Items |          |                      |          |       |
|-------|-------------|---|-----------------|----------|----------------------|----------|-------|
|       |             |   | Multiple-Choice |          | Constructed-Response |          | Total |
|       |             |   | Operational     | Embedded | Operational          | Embedded |       |
| 3     | 1           | 1 | 18              | 6        | 0                    | 0        | 24    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 25              | 6        | 9                    | 0        | 40    |
| 4     | 1           | 1 | 18              | 6        | 0                    | 0        | 24    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 25              | 6        | 9                    | 0        | 40    |
| 5     | 1           | 1 | 28              | 7        | 0                    | 0        | 35    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 35              | 7        | 9                    | 0        | 51    |
| 6     | 1           | 1 | 28              | 7        | 0                    | 0        | 35    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 35              | 7        | 9                    | 0        | 51    |
| 7     | 1           | 1 | 28              | 7        | 0                    | 0        | 35    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 35              | 7        | 9                    | 0        | 51    |
| 8     | 1           | 1 | 28              | 7        | 0                    | 0        | 35    |
|       | 2           | 2 | 7               | 0        | 3                    | 0        | 10    |
|       | 3           | 3 | 0               | 0        | 6                    | 0        | 6     |
|       | Total       |   | 35              | 7        | 9                    | 0        | 51    |

**Table A2. Mathematics Test Configuration**

| Grade | Day Book     |   | Number of Items |          |                      |          |
|-------|--------------|---|-----------------|----------|----------------------|----------|
|       |              |   | Multiple-Choice |          | Constructed-Response |          |
|       |              |   | Operational     | Embedded | Operational          | Embedded |
| 3     | 1            | 1 | 18              | 4        | 0                    | 0        |
|       | 2            | 2 | 19              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 8                    | 0        |
|       | <b>Total</b> |   | <b>37</b>       | <b>7</b> | <b>8</b>             | <b>0</b> |
| 4     | 1            | 1 | 18              | 4        | 0                    | 0        |
|       | 2            | 2 | 20              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 10                   | 0        |
|       | <b>Total</b> |   | <b>38</b>       | <b>7</b> | <b>10</b>            | <b>0</b> |
| 5     | 1            | 1 | 18              | 4        | 0                    | 0        |
|       | 2            | 2 | 19              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 10                   | 0        |
|       | <b>Total</b> |   | <b>37*</b>      | <b>7</b> | <b>10</b>            | <b>0</b> |
| 6     | 1            | 1 | 21              | 4        | 0                    | 0        |
|       | 2            | 2 | 22              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 10                   | 0        |
|       | <b>Total</b> |   | <b>43*</b>      | <b>7</b> | <b>10</b>            | <b>0</b> |
| 7     | 1            | 1 | 22              | 4        | 0                    | 0        |
|       | 2            | 2 | 22              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 10                   | 0        |
|       | <b>Total</b> |   | <b>44</b>       | <b>7</b> | <b>10</b>            | <b>0</b> |
| 8     | 1            | 1 | 22              | 4        | 0                    | 0        |
|       | 2            | 2 | 22              | 3        | 0                    | 0        |
|       | 3            | 3 | 0               | 0        | 10                   | 0        |
|       | <b>Total</b> |   | <b>44</b>       | <b>7</b> | <b>10</b>            | <b>0</b> |

\*One item each in Grades 5 and 6 were excluded from the analysis and scoring due to poor fit to the item response theory (IRT) model.

**Table A3. ELA Estimated Time on Task by Book**

| Grades | Day          | Book | Estimated Time on Task (min.) |
|--------|--------------|------|-------------------------------|
| 3–4    | 1            | 1    | 60–70                         |
|        | 2            | 2    | 60–70                         |
|        | 3            | 3    | 60–70                         |
|        | <b>Total</b> |      | <b>180–210</b>                |
| 5–8    | 1            | 1    | 80–90                         |
|        | 2            | 2    | 80–90                         |
|        | 3            | 3    | 80–90                         |
|        | <b>Total</b> |      | <b>240–270</b>                |

Source: 2016 Common Core ELA and Mathematics Test Guides.

The ELA estimated times on task were based on the following rules of thumb:

- Average time to read a passage—5 minutes
- Average time to respond to a multiple-choice question—1 minute
- Average time to respond to a two-point constructed response question—3 minutes
- Average time to respond to a four-point constructed response question—20 minutes

**Table A4. Mathematics Estimated Time on Task by Book**

| Grade(s) | Day          | Book | Estimated Time Needed (min.) |
|----------|--------------|------|------------------------------|
| 3        | 1            | 1    | 50–60                        |
|          | 2            | 2    | 50–60                        |
|          | 3            | 3    | 60–70                        |
|          | <b>Total</b> |      | <b>160–190</b>               |
| 4        | 1            | 1    | 50–60                        |
|          | 2            | 2    | 50–60                        |
|          | 3            | 3    | 80–90                        |
|          | <b>Total</b> |      | <b>180–210</b>               |
| 5–8      | 1            | 1    | 70–80                        |
|          | 2            | 2    | 70–80                        |
|          | 3            | 3    | 80–90                        |
|          | <b>Total</b> |      | <b>220–250</b>               |

Source: 2016 Common Core ELA and Mathematics Test Guides.

The Mathematics estimated times on task were based on the following rules of thumb:

- Average time to respond to a multiple-choice question—1.5 minutes
- Average time to respond to a two-point constructed response question—5 minutes
- Average time to respond to a three-point constructed response question—9 minutes

The testing times listed above do not include approximately 10 minutes reserved for preparation at the beginning of each session for handing out materials and reading directions. Additional



## Appendix A: ELA and Mathematics Test Configurations and Testing Times

details on security, scheduling, classroom organization and preparation, test materials, and administration can be found in the 2016 *Teacher's Directions* and the *School Administrator's Manual*, which are accessible online:

- *2016 Common Core ELA Teacher's Directions*
  - Grades 3–5: <http://www.p12.nysed.gov/assessment/sam/ei/td-35ela16.pdf>
  - Grades 6–8: <http://www.p12.nysed.gov/assessment/sam/ei/td-68ela16.pdf>
- *2016 Common Core Mathematics Teacher's Directions*
  - Grades 3–5: <http://www.p12.nysed.gov/assessment/sam/ei/td-35math16.pdf>
  - Grades 6–8: <http://www.p12.nysed.gov/assessment/sam/ei/td-68math16.pdf>
- *2016 Common Core ELA and Mathematics Tests School Administrator's Manual*
  - <http://www.p12.nysed.gov/assessment/sam/ei/eisam16.pdf>
- *2016 Common Core ELA and Mathematics Test Guides*
  - <https://www.engageny.org/resource/test-guides-for-english-language-arts-and-mathematics>

## Appendix B: ELA and Mathematics Test Blueprints

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**Table B1. ELA Test Blueprint**

| Grade | Total Points on OP Test | Standard    | Point Range |        | % of Test |        |
|-------|-------------------------|-------------|-------------|--------|-----------|--------|
|       |                         |             | Target      | Actual | Target    | Actual |
| 3     | 55                      | Literature  | 14–44       | 24     | 30%–94%   | 51%    |
|       |                         | Information | 14–44       | 22     | 30%–94%   | 47%    |
|       |                         | Language    | 1–4         | 1      | 2%–9%     | 2%     |
| 4     | 55                      | Literature  | 14–44       | 20     | 30%–94%   | 43%    |
|       |                         | Information | 14–44       | 26     | 30%–94%   | 55%    |
|       |                         | Language    | 1–4         | 1      | 2%–9%     | 2%     |
| 5     | 66                      | Literature  | 18–51       | 27     | 32%–89%   | 47%    |
|       |                         | Information | 18–51       | 28     | 32%–89%   | 49%    |
|       |                         | Language    | 1–4         | 2      | 2%–7%     | 4%     |
| 6     | 65                      | Literature  | 11–44       | 25     | 19%–77%   | 44%    |
|       |                         | Information | 25–58       | 31     | 44%–102%  | 54%    |
|       |                         | Language    | 1–4         | 1      | 2%–7%     | 2%     |
| 7     | 66                      | Literature  | 11–44       | 28     | 19%–77%   | 49%    |
|       |                         | Information | 25–58       | 28     | 44%–102%  | 49%    |
|       |                         | Language    | 1–4         | 1      | 2%–7%     | 2%     |
| 8     | 66                      | Literature  | 11–44       | 26     | 19%–77%   | 46%    |
|       |                         | Information | 25–58       | 30     | 44%–102%  | 53%    |
|       |                         | Language    | 1–4         | 1      | 2%–7%     | 2%     |

**Table B2. Mathematics Test Blueprint**

| Grade | Total Points on OP Test | Standard                              | Point Range |        | % of Test |        |
|-------|-------------------------|---------------------------------------|-------------|--------|-----------|--------|
|       |                         |                                       | Target      | Actual | Target    | Actual |
| 3     | 60                      | Operations and Algebraic Thinking     | 23–31       | 25     | 41%–55%   | 45%    |
|       |                         | Number and Operations in Base Ten     | 3–5         | 4      | 5%–9%     | 7%     |
|       |                         | Number and Operations – Fractions     | 10–14       | 11     | 18%–25%   | 20%    |
|       |                         | Measurement and Data                  | 12–18       | 14     | 21%–32%   | 25%    |
|       |                         | Geometry*                             | 1–3         | 2      | 2%–5%     | 4%     |
| 4     | 66                      | Operations and Algebraic Thinking     | 11–15       | 13     | 18%–24%   | 21%    |
|       |                         | Number and Operations in Base Ten     | 14–20       | 16     | 23%–32%   | 26%    |
|       |                         | Number and Operations – Fractions     | 15–21       | 17     | 24%–34%   | 27%    |
|       |                         | Measurement and Data                  | 9–15        | 10     | 15%–24%   | 16%    |
|       |                         | Geometry                              | 5–7         | 6      | 8%–11%    | 10%    |
| 5     | 66                      | Operations and Algebraic Thinking     | 3–5         | 4      | 5%–8%     | 7%     |
|       |                         | Number and Operations in Base Ten     | 15–21       | 16     | 25%–34%   | 26%    |
|       |                         | Number and Operations – Fractions     | 22–28       | 23     | 36%–46%   | 38%    |
|       |                         | Measurement and Data                  | 12–18       | 15     | 20%–30%   | 25%    |
|       |                         | Geometry*                             | 1–3         | 3      | 2%–5%     | 5%     |
| 6     | 72                      | Ratios and Proportional Relationships | 16–20       | 17     | 24%–30%   | 25%    |
|       |                         | The Number System                     | 13–19       | 17     | 19%–28%   | 25%    |
|       |                         | Expressions and Equations             | 23–33       | 23     | 34%–49%   | 34%    |
|       |                         | Geometry                              | 8–12        | 10     | 12%–18%   | 15%    |
| 7     | 72                      | Ratios and Proportional Relationships | 18–22       | 20     | 26%–32%   | 29%    |
|       |                         | The Number System                     | 12–16       | 12     | 18%–24%   | 18%    |
|       |                         | Expressions and Equations             | 19–25       | 21     | 28%–37%   | 31%    |
|       |                         | Geometry                              | 3–7         | 5      | 4%–10%    | 7%     |
|       |                         | Statistics and Probability            | 8–14        | 10     | 12%–21%   | 15%    |
| 8     | 72                      | Expressions and Equations             | 26–34       | 28     | 38%–50%   | 41%    |
|       |                         | Functions                             | 16–22       | 19     | 24%–32%   | 28%    |
|       |                         | Geometry                              | 14–20       | 15     | 21%–29%   | 22%    |
|       |                         | Statistics and Probability            | 5–7         | 6      | 7%–10%    | 9%     |

\*There is a slight difference between the “Target% of Test” shown in these tables and the tables presented in the Guides to the 2016 Common Core Mathematics Tests. The guides were intended to provide general guidance regarding content coverage of mathematics domains so that classroom instruction would continue to cover the depth and breadth of the Common Core mathematics standards.

## Appendix C: Passage Selection Guidelines for Assessing ELA

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### General Guidelines

Along with instructional materials and teacher training, assessment development is essential to the successful implementation of the CCSS. While many of the expectations outlined in the CCSS align with previous versions of the New York State Learning Standards for ELA, the CCSS do represent some shifts in emphasis with direct implications for assessment development. In particular, the CCSS devote considerable attention to the types and nature of texts used in instruction and assessment. The foundation for preparing students for the linguistic rigors of college and of the workplace lies in the texts with which they interact. By the time that they graduate, students should be prepared to successfully read and analyze the types of complex texts that they will encounter after high school. Selecting passages of appropriate type and complexity for use in assessment is integral to this preparation.

One of the major shifts of the CCSS is an emphasis on developing skills for comprehending and analyzing informational texts. Increased exposure to informational texts better prepares students for the various types of texts that they will encounter in college and in the workplace. The array of passages selected for assessment from K–12 should support the development of the necessary skills to handle this range of informational texts.

Another shift is an increased emphasis on the analysis across multiple texts, often of varied genres and media. Several standards, especially for reading literature, require intertextual and multi-media analysis. These expectations require special attention to the selection of related passages, chosen specifically to support the assessment of the full range of expectations. It will also require careful consideration of which standards are appropriate for large-scale assessment formats, and how these assessments might be modified to include passages of a variety of media.

In addition to the usual fairness and sensitivity guidelines when selecting passages for assessment, attention should be dedicated to three additional considerations:

- *Text Complexity*
- *Text Types*
- *Text Suitability for Specific Standards*

These guidelines should inform the training of passage finders in order to ensure a pool of acceptable passages that can support assessment of all the CCSS Reading Informational Texts standards. They should also alert form assemblers as they construct forms that will assess the complete range of skills.

## Appendix D: Universal Design Item Checklist

| Universal Design Item Checklist |  |
|---------------------------------|--|
| <b>A.</b>                       | <b>Precisely Designed Constructs</b>   |
| Definition                      | The item construct is clearly defined so that all irrelevant cognitive, sensory, emotional, and physical barriers are removed.   |
| √                               | The item does not add skills to those being measured (no extraneous skills tested).  |
| <b>B.</b>                       | <b>Language Appropriateness</b>  |
| Definition                      | The item avoids words or phrases that are sexist, racist, or otherwise offensive, inappropriate, or negative to any subgroup. Language should be simple and clear.   |
| √                               | The item uses commonly used words—simpler is better.   |
| √                               | The item uses vocabulary appropriate for the grade level.  |
| √                               | Idiomatic speech and figurative language are avoided unless being measured.  |
| √                               | The item avoids technical terms unrelated to the content.  |
| √                               | The item contains no unnecessary words.  |
| √                               | The sentence complexity contained in the item is appropriate for the grade level.  |
| √                               | The item avoids ambiguous or multiple-meaning words (e.g., crane—the bird—can easily be confused with crane—heavy machinery).  |
| √                               | All pronouns have clear referents.   |
| √                               | The item avoids the use of proper names. (Such names may be unfamiliar or difficult for cultural subgroups.)   |
| √                               | The item avoids irregularly spelled words.   |
| <b>C.</b>                       | <b>Gender Stereotypes</b>  |
| Definition                      | The item avoids stereotyping as results of associating genders with certain professions or activities. All groups of society should be portrayed accurately and fairly regarding gender.   |
| √                               | The item is free of content that might offend a gender subgroup.   |
| √                               | The item is free of content that might unfairly advantage or disadvantage a gender subgroup.   |
| <b>D.</b>                       | <b>Ethnic Stereotypes</b>  |
| Definition                      | The item avoids unnecessary references to and uses the proper reference for ethnic, racial, or cultural groups.  |
| √                               | The item is free of content that might offend an ethnic subgroup.  |
| √                               | The item is free of content that might unfairly advantage or disadvantage an ethnic subgroup.  |
| √                               | The artwork included in an item adequately reflects the diversity of the student population.   |
| <b>E.</b>                       | <b>Cultural Familiarity</b>  |
| Definition                      | Does not rely on an assumed shared experience that is class oriented or native English speaking oriented. Presentations of cultural or ethnic differences should neither explicitly nor implicitly rely on stereotypes nor make moral judgments. |
| √                               | The item does not rely on an assumed shared experience that is class oriented or native English speaking oriented.   |
| √                               | The item is free from content that might offend a socioeconomic subgroup.  |
| √                               | The item is free of content that might unfairly advantage or disadvantage a socioeconomic subgroup.  |

## Appendix D: Universal Design Item Checklist

| Universal Design Item Checklist |  |
|---------------------------------|--|
| √                               | The item is free from unnecessary cultural references.   |
| √                               | The item is free from religious references.  |
| <b>F.</b>                       | <b>Geographic Bias</b>   |
| Definition                      | All groups of society should be portrayed accurately and fairly regarding geographic setting. A particular geographic setting shouldn't be used repeatedly, and urban, suburban, and rural settings should be represented across items.  |
| √                               | The item is free of content that might offend a geographic subgroup.   |
| √                               | The item is free of content that might unfairly advantage or disadvantage a geographic subgroup.   |
| <b>G.</b>                       | <b>Disability Bias</b>   |
| Definition                      | All groups of society should be portrayed accurately and fairly regarding disability. Stereotypes related to any particular disability should be avoided. No undue restrictions should exist in the item that would interfere with the ability of a student to comprehend or respond to the item.  |
| √                               | The item is free of content that might offend a disability subgroup.   |
| √                               | The item is free of content that might unfairly advantage or disadvantage a disability subgroup.   |
| √                               | A graphic representation is used in the items, as appropriate. The complexity of the graphic is appropriate to the purpose—simpler is better.  |
| √                               | The item avoids content that depends on sensory knowledge (such as references to movement, sound, smell, etc.) unless this is crucial to the overall item.   |
| √                               | The item could be put into Braille.  |
| √                               | The item avoids using both O and Q.  |
| √                               | Letter pairs can be easily distinguished when read. (S and T are okay; S and X are not).   |
| <b>H.</b>                       | <b>Art Supports Text</b>   |
| Definition                      | The art is related to the item and supports the reader when possible. The item text and art are legible and accessible, and the art is appropriately placed in the item to support the reader. The art does not distract the test taker, but instead provides a scaffold to overall comprehension. |
| √                               | All pictures relate to items.  |
| √                               | The item is free from pictorial clutter: All pictures are needed to answer the item.   |
| √                               | Graphics are clear and non-fuzzy.  |
| √                               | Any symbols used are highly distinguishable.   |
| √                               | Visual load requirements are reasonable for the grade level.   |
| √                               | Multi-dimensional graphics and complex shading are avoided.  |
| √                               | Tables have replaced any cluttered graphs.   |
| √                               | Labels read clockwise (as is easier for Braille readers).  |
| <b>I.</b>                       | <b>Special Populations Considerations</b>  |
| Definition                      | Consideration must be given for maximum accessibility to all students including, but not limited to, English language learners, limited sight, hearing impaired, cognitively challenged, etc. These considerations will assist all students.   |
| √                               | The item contains scaffolding techniques to support student understanding of what is being asked in the item.  |
| √                               | Text is replaced with graphic representations, when appropriate.   |
| √                               | The item is written with simplified text load.   |
| √                               | The item is written with simplified sentences.   |

## Appendix D: Universal Design Item Checklist

| Universal Design Item Checklist |   |
|---------------------------------|---|
| √                               | The item has as little extraneous information as possible.  |
| √                               | The item provides context, but it is simplified.  |
| √                               | The item uses smaller or less complicated numbers or expressions where not otherwise required.        |
| √                               | The item avoids negative phrasing or questions; for example, questions are not asked in the negative. |

## Appendix E: Criteria for Item Acceptability

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The following criteria represent best practices in item development, and were implemented during the creation and review of the New York State 3–8 CCSS test questions; however, these criteria are not a substitute for the full, detailed criteria documents, which are available online at the following links:

- <http://www.engageny.org/resource/new-york-state-item-review-criteria-for-grade-3-8-english-language-arts-tests>; and
- <http://www.engageny.org/resource/new-york-state-item-review-criteria-for-grade-3-8-mathematics-tests>.

### For Multiple-Choice Items:

#### Check that the content of each item

- is targeted to assess only one objective or skill (unless specifications indicate otherwise)
- deals with material that is important in testing the targeted performance indicator
- uses grade-appropriate content and thinking skills
- is presented at a reading level suitable for the grade level being tested
- has a stem that facilitates answering the question or completing the statement without looking at the answer choices
- has a stem that does **not** present clues to the correct answer choice
- has answer choices that are plausible and attractive to the student who has not mastered the objective or skill
- has mutually exclusive distractors
- has one and only one correct answer choice
- is free of cultural, racial, ethnic, age, gender, disability, regional, or other apparent bias

#### Check that the format of each item

- is worded in the positive unless it is absolutely necessary to use the negative form
- is free of extraneous words or expressions in both the stem and the answer choices (e.g., the same word or phrase does not begin each answer choice)
- indicates emphasis on key words, such as best, first, least, not, and others that are important and might be overlooked
- places the interrogative word at the **beginning** of a stem in the form of a question, or places the omitted portion of an incomplete statement at the **end** of the statement
- indicates the correct answer choice
- provides the rationale for all distractors
- is conceptually, grammatically, and syntactically consistent—between the stem and answer choices, and among the answer choices
- has answer choices balanced in length, or contains two long and two short answer choices
- clearly identifies the passage or other stimulus material associated with the item
- clearly identifies a need of for art, if applicable, and the art is conceptualized and sketched, with important considerations explicated



**Also check that**

- one item does not present clues to the correct answer choice for any other item
- any item based on a passage is answerable from the information given in the passage and is not dependent on skills related to other content areas
- any item based on a passage is truly passage-dependent; that is, **not** answerable without reference to the passage
- there is a balance of reasonable, non-stereotypical representation of economic classes, races, cultures, ages, genders, and persons with disabilities in context and art

**For Constructed-Response Items:**

**Check that the content of each item is**

- designed to assess the targeted performance indicator
- appropriate for the grade level being tested
- presented at a reading level suitable for the grade level being tested
- appropriate in context
- written so that a student possessing knowledge or skill being tested can construct a response that can be scored with the specified rubric or scoring tool; that is, the range of possible correct responses must be wide enough to allow for a diversity of responses, but narrow enough so that students who do not clearly show their grasp of the objective or skill being assessed cannot obtain the maximum score
- presented without clues to the correct response
- checked for accuracy and documented against reliable, up-to-date sources (including rubrics)
- free of cultural, racial, ethnic, age, gender, disability, or other apparent bias

**Check that the format of each item is**

- appropriate for the question being asked and the intended response
- worded clearly and concisely, using simple vocabulary and sentence structure
- precise and unambiguous in its directions for the desired response
- free of extraneous words or expressions
- worded in the positive form rather than in the negative form
- conceptually, grammatically, and syntactically consistent
- marked with emphasis on key words, such as best, first, least, and others that are important and might be overlooked
- clearly identified as needing art, if applicable, and the art is conceptualized and sketched, with important considerations explicated

**Also check that**

- one item does not present clues to the correct response to any other item
- there is a balance of reasonable, non-stereotypical representation of economic classes, races, cultures, ages, genders, and persons with disabilities in context and art
- for each set of items related to a reading passage, each item is designed to elicit a unique and independent response
- items designed to assess reading do not depend on prior knowledge of the subject matter used in the prompt/question

## **Appendix F: Psychometric Guidelines for Operational Item Selection**

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It is primarily up to the content development department to select items for the 2016 Common Core Operational Test. The psychometrics department will provide support, as necessary, and will review the final item selection. The psychometrics department will provide data files with parameters for all FT items eligible for the item pool. The pools of items eligible for 2016 item selection included 2013, 2014, and 2015 embedded and stand-alone field-test items.

Here are the general guidelines for item selection:

- Satisfy the content specifications in terms of objective coverage and the number and percentage of MC and CR items on the test. An often-used criterion for objective coverage is within 5% of the percentages of score points and items per objective.
- To the extent possible, select both easy and difficult items to provide good measurement information at both ends of the performance scale.
- Avoid selecting items with too high/low p-values, items with flagged point biserials, and poorly fitting items.
- Minimize the number of items flagged for DIF (gender, ethnic, and High/Low Needs schools). Flagged items should be reviewed for content again. It needs to be remembered that some items may be flagged for DIF by chance only, and that their content may not necessarily be biased against any of the analyzed subgroups. The psychometrics department will provide DIF information for each item. It is also possible to get “significant” DIF, but not bias, if the content is a necessary part of the construct that is measured. That is, there may be some non-false positive DIF flags on items that do not exhibit bias.
- Provide the NYSED with the following summary information:
  - Overview of the statistical properties of the tests
  - Blueprint comparison between the test build and the target. The focus is on the total number of points on the test
  - Raw score proportion correct comparison between the test build and the reference (i.e., Spring 2015 test)
  - Vertically linked average difficulty parameter (MC items only) across all grades
  - Vertically linked TCC based on the constructed test
  - TCC, Test Information Curves and Conditional SEM Curves for each subject and grade, again using the Spring 2015 operational test as a reference.

## Appendix G: Operational Item Maps

The following tables show the operational item maps for the 2016 NYSTP Grades 3–8 Common Core ELA and Mathematics Tests. External linking and field test items (i.e., those not contributing to students’ scores) have been omitted. Additional detail on the standards to which these items align may be found at: <http://www.engageny.org/resource/new-york-state-p-12-common-core-learning-standards>.

**Table G1. ELA Grade 3 Operational Item Map**

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RL.3.5                             |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RL.3.1                             |
| 3    | MC   | 1      | CCSS.ELA-Literacy.RL.3.1                             |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RL.3.4                             |
| 5    | MC   | 1      | CCSS.ELA-Literacy.RL.3.2                             |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RL.3.3                             |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RL.3.2                             |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RL.3.5                             |
| 15   | MC   | 1      | CCSS.ELA-Literacy.RL.3.4                             |
| 16   | MC   | 1      | CCSS.ELA-Literacy.RL.3.1                             |
| 17   | MC   | 1      | CCSS.ELA-Literacy.RL.3.3                             |
| 18   | MC   | 1      | CCSS.ELA-Literacy.RL.3.1                             |
| 19   | MC   | 1      | CCSS.ELA-Literacy.RI.3.7                             |
| 20   | MC   | 1      | CCSS.ELA-Literacy.RI.3.8                             |
| 21   | MC   | 1      | CCSS.ELA-Literacy.RI.3.4                             |
| 22   | MC   | 1      | CCSS.ELA-Literacy.RI.3.3                             |
| 23   | MC   | 1      | CCSS.ELA-Literacy.RI.3.3                             |
| 24   | MC   | 1      | CCSS.ELA-Literacy.RI.3.2                             |
| 25   | MC   | 1      | CCSS.ELA-Literacy.L.3.4a                             |
| 26   | MC   | 1      | CCSS.ELA-Literacy.RI.3.1                             |
| 27   | MC   | 1      | CCSS.ELA-Literacy.RI.3.4                             |
| 28   | MC   | 1      | CCSS.ELA-Literacy.RI.3.2                             |
| 29   | MC   | 1      | CCSS.ELA-Literacy.RI.3.1                             |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RI.3.8                             |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RI.3.5                             |
| 32   | CR   | 2      | CCSS.ELA-Literacy.RI.3.8                             |
| 33   | CR   | 2      | CCSS.ELA-Literacy.RI.3.6                             |
| 34   | CR   | 4      | CCSS.ELA-Literacy.W.3.2,<br>CCSS.ELA-Literacy.RL.3.3 |
| 35   | CR   | 2      | CCSS.ELA-Literacy.RL.3.3                             |
| 36   | CR   | 2      | CCSS.ELA-Literacy.RL.3.5                             |
| 37   | CR   | 2      | CCSS.ELA-Literacy.RL.3.3                             |

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 38   | CR   | 2      | CCSS.ELA-Literacy.RL.3.3                             |
| 39   | CR   | 2      | CCSS.ELA-Literacy.RI.3.1                             |
| 40   | CR   | 4      | CCSS.ELA-Literacy.W.3.2,<br>CCSS.ELA-Literacy.RI.3.3 |

**Table G2. ELA Grade 4 Operational Item Map**

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RL.4.1   |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RL.4.1   |
| 3    | MC   | 1      | CCSS.ELA-Literacy.L.4.5a   |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RL.4.2   |
| 5    | MC   | 1      | CCSS.ELA-Literacy.RL.4.1   |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RL.4.3   |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RI.4.8   |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RI.4.8   |
| 15   | MC   | 1      | CCSS.ELA-Literacy.RI.4.1   |
| 16   | MC   | 1      | CCSS.ELA-Literacy.RI.4.3   |
| 17   | MC   | 1      | CCSS.ELA-Literacy.RI.4.3   |
| 18   | MC   | 1      | CCSS.ELA-Literacy.RI.4.5   |
| 19   | MC   | 1      | CCSS.ELA-Literacy.RI.4.8   |
| 20   | MC   | 1      | CCSS.ELA-Literacy.RI.4.4   |
| 21   | MC   | 1      | CCSS.ELA-Literacy.RI.4.3   |
| 22   | MC   | 1      | CCSS.ELA-Literacy.RI.4.2   |
| 23   | MC   | 1      | CCSS.ELA-Literacy.RI.4.2   |
| 24   | MC   | 1      | CCSS.ELA-Literacy.RI.4.5   |
| 25   | MC   | 1      | CCSS.ELA-Literacy.RL.4.5   |
| 26   | MC   | 1      | CCSS.ELA-Literacy.RL.4.4   |
| 27   | MC   | 1      | CCSS.ELA-Literacy.RL.4.1   |
| 28   | MC   | 1      | CCSS.ELA-Literacy.RL.4.1   |
| 29   | MC   | 1      | CCSS.ELA-Literacy.RL.4.5   |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RL.4.3   |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RL.4.2   |
| 32   | CR   | 2      | CCSS.ELA-Literacy.RI.4.7   |
| 33   | CR   | 2      | CCSS.ELA-Literacy.RI.4.6   |
| 34   | CR   | 4      | CCSS.ELA-Literacy.W.4.2,<br>CCSS.ELA-Literacy.W.4.9,<br>CCSS.ELA-Literacy.RL.4.3 |
| 35   | CR   | 2      | CCSS.ELA-Literacy.RL.4.2   |
| 36   | CR   | 2      | CCSS.ELA-Literacy.RL.4.3   |
| 37   | CR   | 2      | CCSS.ELA-Literacy.RI.4.1   |

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 38   | CR   | 2      | CCSS.ELA-Literacy.RI.4.2   |
| 39   | CR   | 2      | CCSS.ELA-Literacy.RI.4.1   |
| 40   | CR   | 4      | CCSS.ELA-Literacy.W.4.2,<br>CCSS.ELA-Literacy.W.4.9,<br>CCSS.ELA-Literacy.RI.4.9 |

**Table G3. ELA Grade 5 Operational Item Map**

| Item | Type | Points | Standard                 |
|------|------|--------|--------------------------|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RI.5.1 |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RI.5.2 |
| 3    | MC   | 1      | CCSS.ELA-Literacy.RI.5.1 |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RI.5.3 |
| 5    | MC   | 1      | CCSS.ELA-Literacy.L.5.5b |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RI.5.3 |
| 7    | MC   | 1      | CCSS.ELA-Literacy.RI.5.2 |
| 8    | MC   | 1      | CCSS.ELA-Literacy.RL.5.4 |
| 9    | MC   | 1      | CCSS.ELA-Literacy.RL.5.3 |
| 10   | MC   | 1      | CCSS.ELA-Literacy.RL.5.1 |
| 11   | MC   | 1      | CCSS.ELA-Literacy.RL.5.5 |
| 12   | MC   | 1      | CCSS.ELA-Literacy.RL.5.1 |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RL.5.6 |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RL.5.2 |
| 15   | MC   | 1      | CCSS.ELA-Literacy.RL.5.5 |
| 16   | MC   | 1      | CCSS.ELA-Literacy.L.5.4a |
| 17   | MC   | 1      | CCSS.ELA-Literacy.RL.5.3 |
| 18   | MC   | 1      | CCSS.ELA-Literacy.RL.5.3 |
| 19   | MC   | 1      | CCSS.ELA-Literacy.RL.5.1 |
| 20   | MC   | 1      | CCSS.ELA-Literacy.RL.5.3 |
| 21   | MC   | 1      | CCSS.ELA-Literacy.RL.5.2 |
| 29   | MC   | 1      | CCSS.ELA-Literacy.RI.5.8 |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RI.5.2 |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RI.5.8 |
| 32   | MC   | 1      | CCSS.ELA-Literacy.RI.5.8 |
| 33   | MC   | 1      | CCSS.ELA-Literacy.RI.5.4 |
| 34   | MC   | 1      | CCSS.ELA-Literacy.RI.5.1 |
| 35   | MC   | 1      | CCSS.ELA-Literacy.RI.5.4 |
| 36   | MC   | 1      | CCSS.ELA-Literacy.RI.5.8 |
| 37   | MC   | 1      | CCSS.ELA-Literacy.RI.5.1 |
| 38   | MC   | 1      | CCSS.ELA-Literacy.RI.5.5 |
| 39   | MC   | 1      | CCSS.ELA-Literacy.RI.5.1 |

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 40   | MC   | 1      | CCSS.ELA-Literacy.RI.5.3   |
| 41   | MC   | 1      | CCSS.ELA-Literacy.RI.5.2   |
| 42   | MC   | 1      | CCSS.ELA-Literacy.RI.5.2   |
| 43   | CR   | 2      | CCSS.ELA-Literacy.RI.5.2   |
| 44   | CR   | 2      | CCSS.ELA-Literacy.RI.5.2   |
| 45   | CR   | 4      | CCSS.ELA-Literacy.W.5.2,<br>CCSS.ELA-Literacy.W.5.9,<br>CCSS.ELA-Literacy.RI.5.8 |
| 46   | CR   | 2      | CCSS.ELA-Literacy.RL.5.3   |
| 47   | CR   | 2      | CCSS.ELA-Literacy.RL.5.5   |
| 48   | CR   | 2      | CCSS.ELA-Literacy.RL.5.3   |
| 49   | CR   | 2      | CCSS.ELA-Literacy.RL.5.4   |
| 50   | CR   | 2      | CCSS.ELA-Literacy.RL.5.2   |
| 51   | CR   | 4      | CCSS.ELA-Literacy.W.5.2,<br>CCSS.ELA-Literacy.W.5.9,<br>CCSS.ELA-Literacy.RL.5.3 |

**Table G4. ELA Grade 6 Operational Item Map**

| Item | Type | Points | Standard                 |
|------|------|--------|--------------------------|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RL.6.5 |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RL.6.4 |
| 3    | MC   | 1      | CCSS.ELA-Literacy.RL.6.3 |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RL.6.2 |
| 5    | MC   | 1      | CCSS.ELA-Literacy.RL.6.1 |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RL.6.3 |
| 7    | MC   | 1      | CCSS.ELA-Literacy.RL.6.6 |
| 8    | MC   | 1      | CCSS.ELA-Literacy.RI.6.4 |
| 9    | MC   | 1      | CCSS.ELA-Literacy.RI.6.3 |
| 10   | MC   | 1      | CCSS.ELA-Literacy.RI.6.8 |
| 11   | MC   | 1      | CCSS.ELA-Literacy.RI.6.6 |
| 12   | MC   | 1      | CCSS.ELA-Literacy.RI.6.2 |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RI.6.5 |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RI.6.2 |
| 22   | MC   | 1      | CCSS.ELA-Literacy.RL.6.2 |
| 23   | MC   | 1      | CCSS.ELA-Literacy.RL.6.4 |
| 24   | MC   | 1      | CCSS.ELA-Literacy.L.6.4c |
| 25   | MC   | 1      | CCSS.ELA-Literacy.RL.6.1 |
| 26   | MC   | 1      | CCSS.ELA-Literacy.RL.6.3 |
| 27   | MC   | 1      | CCSS.ELA-Literacy.RL.6.2 |
| 28   | MC   | 1      | CCSS.ELA-Literacy.RL.6.1 |

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 29   | MC   | 1      | CCSS.ELA-Literacy.RI.6.5   |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RI.6.1   |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RI.6.4   |
| 32   | MC   | 1      | CCSS.ELA-Literacy.RI.6.3   |
| 33   | MC   | 1      | CCSS.ELA-Literacy.RI.6.8   |
| 34   | MC   | 1      | CCSS.ELA-Literacy.RI.6.2   |
| 35   | MC   | 1      | CCSS.ELA-Literacy.RI.6.6   |
| 36   | MC   | 1      | CCSS.ELA-Literacy.RI.6.3   |
| 37   | MC   | 1      | CCSS.ELA-Literacy.RI.6.4   |
| 38   | MC   | 1      | CCSS.ELA-Literacy.RI.6.1   |
| 39   | MC   | 1      | CCSS.ELA-Literacy.RI.6.2   |
| 40   | MC   | 1      | CCSS.ELA-Literacy.RI.6.5   |
| 41   | MC   | 1      | CCSS.ELA-Literacy.RI.6.8   |
| 42   | MC   | 1      | CCSS.ELA-Literacy.RI.6.5   |
| 43   | CR   | 2      | CCSS.ELA-Literacy.RL.6.2   |
| 44   | CR   | 2      | CCSS.ELA-Literacy.RL.6.3   |
| 45   | CR   | 4      | CCSS.ELA-Literacy.W.6.2,<br>CCSS.ELA-Literacy.W.6.9,<br>CCSS.ELA-Literacy.RL.6.3 |
| 46   | CR   | 2      | CCSS.ELA-Literacy.RL.6.3   |
| 47   | CR   | 2      | CCSS.ELA-Literacy.RL.6.5   |
| 48   | CR   | 2      | CCSS.ELA-Literacy.RI.6.2   |
| 49   | CR   | 2      | CCSS.ELA-Literacy.RI.6.5   |
| 50   | CR   | 2      | CCSS.ELA-Literacy.RI.6.6   |
| 51   | CR   | 4      | CCSS.ELA-Literacy.W.6.2,<br>CCSS.ELA-Literacy.W.6.9,<br>CCSS.ELA-Literacy.RI.6.3 |

**Table G5. ELA Grade 7 Operational Item Map**

| Item | Type | Points | Standard                 |
|------|------|--------|--------------------------|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RI.7.5 |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RI.7.8 |
| 3    | MC   | 1      | CCSS.ELA-Literacy.RI.7.1 |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RI.7.3 |
| 5    | MC   | 1      | CCSS.ELA-Literacy.RI.7.3 |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RI.7.2 |
| 7    | MC   | 1      | CCSS.ELA-Literacy.RI.7.5 |
| 8    | MC   | 1      | CCSS.ELA-Literacy.RI.7.6 |
| 9    | MC   | 1      | CCSS.ELA-Literacy.RI.7.3 |
| 10   | MC   | 1      | CCSS.ELA-Literacy.L.7.4a |

# Appendix G: Operational Item Maps

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 11   | MC   | 1      | CCSS.ELA-Literacy.RI.7.2   |
| 12   | MC   | 1      | CCSS.ELA-Literacy.RI.7.1   |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RI.7.8   |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RI.7.8   |
| 15   | MC   | 1      | CCSS.ELA-Literacy.RL.7.1   |
| 16   | MC   | 1      | CCSS.ELA-Literacy.RL.7.5   |
| 17   | MC   | 1      | CCSS.ELA-Literacy.RL.7.1   |
| 18   | MC   | 1      | CCSS.ELA-Literacy.RL.7.3   |
| 19   | MC   | 1      | CCSS.ELA-Literacy.RL.7.4   |
| 20   | MC   | 1      | CCSS.ELA-Literacy.RL.7.3   |
| 21   | MC   | 1      | CCSS.ELA-Literacy.RL.7.3   |
| 29   | MC   | 1      | CCSS.ELA-Literacy.RL.7.5   |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RL.7.1   |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RL.7.3   |
| 32   | MC   | 1      | CCSS.ELA-Literacy.RL.7.2   |
| 33   | MC   | 1      | CCSS.ELA-Literacy.RL.7.6   |
| 34   | MC   | 1      | CCSS.ELA-Literacy.RL.7.4   |
| 35   | MC   | 1      | CCSS.ELA-Literacy.RL.7.2   |
| 36   | MC   | 1      | CCSS.ELA-Literacy.RI.7.2   |
| 37   | MC   | 1      | CCSS.ELA-Literacy.RI.7.4   |
| 38   | MC   | 1      | CCSS.ELA-Literacy.RI.7.2   |
| 39   | MC   | 1      | CCSS.ELA-Literacy.RI.7.3   |
| 40   | MC   | 1      | CCSS.ELA-Literacy.RI.7.5   |
| 41   | MC   | 1      | CCSS.ELA-Literacy.RI.7.1   |
| 42   | MC   | 1      | CCSS.ELA-Literacy.RI.7.1   |
| 43   | CR   | 2      | CCSS.ELA-Literacy.RL.7.3   |
| 44   | CR   | 2      | CCSS.ELA-Literacy.RL.7.3   |
| 45   | CR   | 4      | CCSS.ELA-Literacy.W.7.2,<br>CCSS.ELA-Literacy.W.7.9,<br>CCSS.ELA-Literacy.RI.7.2 |
| 46   | CR   | 2      | CCSS.ELA-Literacy.RI.7.7   |
| 47   | CR   | 2      | CCSS.ELA-Literacy.RI.7.3   |
| 48   | CR   | 2      | CCSS.ELA-Literacy.RL.7.2   |
| 49   | CR   | 2      | CCSS.ELA-Literacy.RL.7.5   |
| 50   | CR   | 2      | CCSS.ELA-Literacy.RL.7.6   |
| 51   | CR   | 4      | CCSS.ELA-Literacy.W.7.2,<br>CCSS.ELA-Literacy.W.7.9,<br>CCSS.ELA-Literacy.RL.7.9 |



**Table G6. ELA Grade 8 Operational Item Map**

| Item | Type | Points | Standard                 |
|------|------|--------|--------------------------|
| 1    | MC   | 1      | CCSS.ELA-Literacy.RL.8.1 |
| 2    | MC   | 1      | CCSS.ELA-Literacy.RL.8.1 |
| 3    | MC   | 1      | CCSS.ELA-Literacy.RL.8.1 |
| 4    | MC   | 1      | CCSS.ELA-Literacy.RL.8.3 |
| 5    | MC   | 1      | CCSS.ELA-Literacy.RL.8.3 |
| 6    | MC   | 1      | CCSS.ELA-Literacy.RL.8.5 |
| 7    | MC   | 1      | CCSS.ELA-Literacy.RL.8.2 |
| 8    | MC   | 1      | CCSS.ELA-Literacy.RI.8.5 |
| 9    | MC   | 1      | CCSS.ELA-Literacy.L.8.4  |
| 10   | MC   | 1      | CCSS.ELA-Literacy.RI.8.4 |
| 11   | MC   | 1      | CCSS.ELA-Literacy.RI.8.3 |
| 12   | MC   | 1      | CCSS.ELA-Literacy.RI.8.6 |
| 13   | MC   | 1      | CCSS.ELA-Literacy.RI.8.8 |
| 14   | MC   | 1      | CCSS.ELA-Literacy.RI.8.3 |
| 22   | MC   | 1      | CCSS.ELA-Literacy.RL.8.3 |
| 23   | MC   | 1      | CCSS.ELA-Literacy.RL.8.4 |
| 24   | MC   | 1      | CCSS.ELA-Literacy.RL.8.1 |
| 25   | MC   | 1      | CCSS.ELA-Literacy.RL.8.3 |
| 26   | MC   | 1      | CCSS.ELA-Literacy.RL.8.6 |
| 27   | MC   | 1      | CCSS.ELA-Literacy.RL.8.6 |
| 28   | MC   | 1      | CCSS.ELA-Literacy.RL.8.2 |
| 29   | MC   | 1      | CCSS.ELA-Literacy.RI.8.4 |
| 30   | MC   | 1      | CCSS.ELA-Literacy.RI.8.1 |
| 31   | MC   | 1      | CCSS.ELA-Literacy.RI.8.3 |
| 32   | MC   | 1      | CCSS.ELA-Literacy.RI.8.3 |
| 33   | MC   | 1      | CCSS.ELA-Literacy.RI.8.8 |
| 34   | MC   | 1      | CCSS.ELA-Literacy.RI.8.5 |
| 35   | MC   | 1      | CCSS.ELA-Literacy.RI.8.2 |
| 36   | MC   | 1      | CCSS.ELA-Literacy.RI.8.3 |
| 37   | MC   | 1      | CCSS.ELA-Literacy.RI.8.5 |
| 38   | MC   | 1      | CCSS.ELA-Literacy.RI.8.4 |
| 39   | MC   | 1      | CCSS.ELA-Literacy.RI.8.1 |
| 40   | MC   | 1      | CCSS.ELA-Literacy.RI.8.7 |
| 41   | MC   | 1      | CCSS.ELA-Literacy.RI.8.2 |
| 42   | MC   | 1      | CCSS.ELA-Literacy.RI.8.2 |
| 43   | CR   | 2      | CCSS.ELA-Literacy.RL.8.3 |
| 44   | CR   | 2      | CCSS.ELA-Literacy.RL.8.3 |

| Item | Type | Points | Standard   |
|------|------|--------|--|
| 45   | CR   | 4      | CCSS.ELA-Literacy.W.8.2,<br>CCSS.ELA-Literacy.W.8.9,<br>CCSS.ELA-Literacy.RL.8.3 |
| 46   | CR   | 2      | CCSS.ELA-Literacy.RL.8.4   |
| 47   | CR   | 2      | CCSS.ELA-Literacy.RL.8.6   |
| 48   | CR   | 2      | CCSS.ELA-Literacy.RI.8.2   |
| 49   | CR   | 2      | CCSS.ELA-Literacy.RI.8.1   |
| 50   | CR   | 2      | CCSS.ELA-Literacy.RI.8.4   |
| 51   | CR   | 4      | CCSS.ELA-Literacy.W.8.2,<br>CCSS.ELA-Literacy.W.8.9,<br>CCSS.ELA-Literacy.RI.8.8 |

**Table G7. Mathematics Grade 3 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.3.MD.A.1  |
| 2    | MC   | 1      | CCSS.Math.Content.3.NBT.A.1 |
| 3    | MC   | 1      | CCSS.Math.Content.3.NF.A.3c |
| 4    | MC   | 1      | CCSS.Math.Content.3.G.A.2   |
| 6    | MC   | 1      | CCSS.Math.Content.3.OA.A.3  |
| 7    | MC   | 1      | CCSS.Math.Content.3.NBT.A.3 |
| 8    | MC   | 1      | CCSS.Math.Content.3.OA.A.4  |
| 9    | MC   | 1      | CCSS.Math.Content.3.MD.A.1  |
| 11   | MC   | 1      | CCSS.Math.Content.3.MD.C.6  |
| 12   | MC   | 1      | CCSS.Math.Content.3.OA.D.9  |
| 13   | MC   | 1      | CCSS.Math.Content.3.OA.B.6  |
| 14   | MC   | 1      | CCSS.Math.Content.3.MD.C.7d |
| 16   | MC   | 1      | CCSS.Math.Content.3.MD.A.2  |
| 17   | MC   | 1      | CCSS.Math.Content.3.OA.D.8  |
| 19   | MC   | 1      | CCSS.Math.Content.3.OA.A.3  |
| 20   | MC   | 1      | CCSS.Math.Content.3.NF.A.1  |
| 21   | MC   | 1      | CCSS.Math.Content.3.OA.A.1  |
| 22   | MC   | 1      | CCSS.Math.Content.3.NF.A.3a |
| 23   | MC   | 1      | CCSS.Math.Content.3.OA.A.4  |
| 24   | MC   | 1      | CCSS.Math.Content.3.NBT.A.3 |
| 25   | MC   | 1      | CCSS.Math.Content.3.OA.D.8  |
| 26   | MC   | 1      | CCSS.Math.Content.3.NF.A.1  |
| 27   | MC   | 1      | CCSS.Math.Content.3.OA.A.1  |
| 28   | MC   | 1      | CCSS.Math.Content.3.MD.C.5b |
| 30   | MC   | 1      | CCSS.Math.Content.3.NF.A.2a |
| 31   | MC   | 1      | CCSS.Math.Content.3.MD.C.6  |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 32   | MC   | 1      | CCSS.Math.Content.3.NBT.A.1 |
| 33   | MC   | 1      | CCSS.Math.Content.3.MD.A.2  |
| 34   | MC   | 1      | CCSS.Math.Content.3.G.A.2   |
| 35   | MC   | 1      | CCSS.Math.Content.3.OA.A.3  |
| 37   | MC   | 1      | CCSS.Math.Content.3.OA.B.6  |
| 38   | MC   | 1      | CCSS.Math.Content.3.MD.C.7a |
| 39   | MC   | 1      | CCSS.Math.Content.3.OA.D.9  |
| 40   | MC   | 1      | CCSS.Math.Content.3.OA.A.3  |
| 41   | MC   | 1      | CCSS.Math.Content.3.NF.A.1  |
| 42   | MC   | 1      | CCSS.Math.Content.3.OA.D.8  |
| 43   | MC   | 1      | CCSS.Math.Content.3.MD.B.3  |
| 45   | CR   | 2      | CCSS.Math.Content.3.NF.A.2  |
| 46   | CR   | 2      | CCSS.Math.Content.3.OA.B.5  |
| 47   | CR   | 2      | CCSS.Math.Content.3.MD.B.3  |
| 48   | CR   | 2      | CCSS.Math.Content.3.OA.A.2  |
| 49   | CR   | 2      | CCSS.Math.Content.3.MD.C.7c |
| 50   | CR   | 3      | CCSS.Math.Content.3.OA.A.3  |
| 51   | CR   | 3      | CCSS.Math.Content.3.NF.A.3b |
| 52   | CR   | 3      | CCSS.Math.Content.3.OA.D.8  |

**Table G8. Mathematics Grade 4 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.4.NBT.A.2 |
| 2    | MC   | 1      | CCSS.Math.Content.4.OA.A.2  |
| 3    | MC   | 1      | CCSS.Math.Content.4.NF.A.1  |
| 4    | MC   | 1      | CCSS.Math.Content.4.NF.B.3c |
| 5    | MC   | 1      | CCSS.Math.Content.4.NBT.A.1 |
| 6    | MC   | 1      | CCSS.Math.Content.4.OA.A.2  |
| 7    | MC   | 1      | CCSS.Math.Content.4.G.A.1   |
| 8    | MC   | 1      | CCSS.Math.Content.4.MD.C.5a |
| 9    | MC   | 1      | CCSS.Math.Content.4.OA.A.3  |
| 10   | MC   | 1      | CCSS.Math.Content.4.NF.A.2  |
| 12   | MC   | 1      | CCSS.Math.Content.4.NBT.B.5 |
| 13   | MC   | 1      | CCSS.Math.Content.4.NF.B.4c |
| 14   | MC   | 1      | CCSS.Math.Content.4.G.A.3   |
| 16   | MC   | 1      | CCSS.Math.Content.4.NBT.B.6 |
| 17   | MC   | 1      | CCSS.Math.Content.4.MD.C.6  |
| 18   | MC   | 1      | CCSS.Math.Content.4.NBT.A.1 |
| 19   | MC   | 1      | CCSS.Math.Content.3.MD.D.8  |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 20   | MC   | 1      | CCSS.Math.Content.4.G.A.1   |
| 23   | MC   | 1      | CCSS.Math.Content.4.NBT.B.5 |
| 24   | MC   | 1      | CCSS.Math.Content.4.G.A.1   |
| 25   | MC   | 1      | CCSS.Math.Content.4.NF.A.2  |
| 26   | MC   | 1      | CCSS.Math.Content.4.MD.C.5b |
| 27   | MC   | 1      | CCSS.Math.Content.4.OA.C.5  |
| 28   | MC   | 1      | CCSS.Math.Content.4.MD.C.6  |
| 29   | MC   | 1      | CCSS.Math.Content.4.OA.A.1  |
| 30   | MC   | 1      | CCSS.Math.Content.4.NBT.B.6 |
| 31   | MC   | 1      | CCSS.Math.Content.4.NF.B.3a |
| 32   | MC   | 1      | CCSS.Math.Content.4.NBT.B.5 |
| 33   | MC   | 1      | CCSS.Math.Content.4.MD.B.4  |
| 34   | MC   | 1      | CCSS.Math.Content.4.NF.B.4b |
| 35   | MC   | 1      | CCSS.Math.Content.4.NBT.A.3 |
| 37   | MC   | 1      | CCSS.Math.Content.4.NF.A.1  |
| 38   | MC   | 1      | CCSS.Math.Content.4.OA.A.2  |
| 39   | MC   | 1      | CCSS.Math.Content.4.NBT.B.6 |
| 40   | MC   | 1      | CCSS.Math.Content.4.NBT.A.1 |
| 42   | MC   | 1      | CCSS.Math.Content.4.NF.B.4b |
| 43   | MC   | 1      | CCSS.Math.Content.4.OA.B.4  |
| 45   | MC   | 1      | CCSS.Math.Content.4.NF.A.2  |
| 46   | CR   | 2      | CCSS.Math.Content.4.MD.A.3  |
| 47   | CR   | 2      | CCSS.Math.Content.4.NBT.A.2 |
| 48   | CR   | 2      | CCSS.Math.Content.4.NF.A.1  |
| 49   | CR   | 2      | CCSS.Math.Content.4.MD.C.7  |
| 50   | CR   | 2      | CCSS.Math.Content.4.NF.B.4c |
| 51   | CR   | 2      | CCSS.Math.Content.4.G.A.2   |
| 52   | CR   | 3      | CCSS.Math.Content.4.OA.A.3  |
| 53   | CR   | 3      | CCSS.Math.Content.4.NF.B.3d |
| 54   | CR   | 3      | CCSS.Math.Content.4.NBT.B.5 |
| 55   | CR   | 3      | CCSS.Math.Content.4.OA.A.2  |

**Table G9. Mathematics Grade 5 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.5.NBT.B.7 |
| 2    | MC   | 1      | CCSS.Math.Content.5.NF.A.1  |
| 3    | MC   | 1      | CCSS.Math.Content.5.NBT.B.6 |
| 4    | MC   | 1      | CCSS.Math.Content.5.NF.A.2  |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 5    | MC   | 1      | CCSS.Math.Content.5.G.B.4   |
| 6    | MC   | 1      | CCSS.Math.Content.4.MD.A.2  |
| 8    | MC   | 1      | CCSS.Math.Content.5.NBT.A.1 |
| 9    | MC   | 1      | CCSS.Math.Content.5.NF.B.7b |
| 10   | MC   | 1      | CCSS.Math.Content.5.MD.C.3b |
| 11   | MC   | 1      | CCSS.Math.Content.4.NF.C.5  |
| 13   | MC   | 1      | CCSS.Math.Content.5.NF.B.4a |
| 14   | MC   | 1      | CCSS.Math.Content.5.MD.C.4  |
| 15   | MC   | 1      | CCSS.Math.Content.5.MD.B.2  |
| 16   | MC   | 1      | CCSS.Math.Content.5.MD.A.1  |
| 17   | MC   | 1      | CCSS.Math.Content.4.NF.C.7  |
| 18   | MC   | 1      | CCSS.Math.Content.5.NF.B.3  |
| 19   | MC   | 1      | CCSS.Math.Content.5.MD.A.1  |
| 20   | MC   | 1      | CCSS.Math.Content.5.NF.B.6  |
| 23   | MC   | 1      | CCSS.Math.Content.5.OA.A.1  |
| 24   | MC   | 1      | CCSS.Math.Content.5.G.B.4   |
| 25   | MC   | 1      | CCSS.Math.Content.4.NF.C.6  |
| 26   | MC   | 1      | CCSS.Math.Content.5.NBT.B.6 |
| 27   | MC   | 1      | CCSS.Math.Content.5.NF.B.4a |
| 28   | MC   | 1      | CCSS.Math.Content.5.NBT.A.2 |
| 29   | MC   | 1      | CCSS.Math.Content.4.MD.A.1  |
| 31   | MC   | 1      | CCSS.Math.Content.5.NBT.B.6 |
| 33   | MC   | 1      | CCSS.Math.Content.5.MD.C.4  |
| 34   | MC   | 1      | CCSS.Math.Content.5.NF.B.5b |
| 36   | MC   | 1      | CCSS.Math.Content.5.G.B.3   |
| 37   | MC   | 1      | CCSS.Math.Content.5.NF.B.3  |
| 39   | MC   | 1      | CCSS.Math.Content.5.NBT.A.4 |
| 40   | MC   | 1      | CCSS.Math.Content.5.NF.B.4b |
| 41   | MC   | 1      | CCSS.Math.Content.5.MD.C.5b |
| 42   | MC   | 1      | CCSS.Math.Content.5.NF.A.2  |
| 43   | MC   | 1      | CCSS.Math.Content.5.MD.B.2  |
| 44   | MC   | 1      | CCSS.Math.Content.5.NF.B.6  |
| 45   | MC   | 1      | CCSS.Math.Content.5.OA.A.1  |
| 46   | CR   | 2      | CCSS.Math.Content.5.NBT.A.3 |
| 47   | CR   | 2      | CCSS.Math.Content.5.NF.B.7c |
| 48   | CR   | 2      | CCSS.Math.Content.5.NBT.B.6 |
| 49   | CR   | 2      | CCSS.Math.Content.5.NF.B.5b |
| 50   | CR   | 2      | CCSS.Math.Content.5.MD.A.1  |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 51   | CR   | 2      | CCSS.Math.Content.5.OA.A.2  |
| 52   | CR   | 3      | CCSS.Math.Content.5.NF.A.2  |
| 53   | CR   | 3      | CCSS.Math.Content.5.NBT.B.7 |
| 54   | CR   | 3      | CCSS.Math.Content.5.NF.B.6  |
| 55   | CR   | 3      | CCSS.Math.Content.5.MD.C.5b |
|      |      |        |                             |

**Table G10. Mathematics Grade 6 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.6.EE.B.6  |
| 2    | MC   | 1      | CCSS.Math.Content.5.G.A.1   |
| 4    | MC   | 1      | CCSS.Math.Content.6.RP.A.3b |
| 5    | MC   | 1      | CCSS.Math.Content.6.NS.B.4  |
| 7    | MC   | 1      | CCSS.Math.Content.5.OA.B.3  |
| 8    | MC   | 1      | CCSS.Math.Content.6.G.A.4   |
| 9    | MC   | 1      | CCSS.Math.Content.6.G.A.2   |
| 11   | MC   | 1      | CCSS.Math.Content.6.EE.C.9  |
| 12   | MC   | 1      | CCSS.Math.Content.6.EE.A.4  |
| 13   | MC   | 1      | CCSS.Math.Content.6.NS.A.1  |
| 14   | MC   | 1      | CCSS.Math.Content.6.NS.C.6c |
| 15   | MC   | 1      | CCSS.Math.Content.6.RP.A.3d |
| 16   | MC   | 1      | CCSS.Math.Content.6.EE.B.8  |
| 17   | MC   | 1      | CCSS.Math.Content.6.NS.A.1  |
| 18   | MC   | 1      | CCSS.Math.Content.6.NS.C.6a |
| 19   | MC   | 1      | CCSS.Math.Content.6.EE.C.9  |
| 20   | MC   | 1      | CCSS.Math.Content.6.RP.A.3a |
| 21   | MC   | 1      | CCSS.Math.Content.6.EE.B.6  |
| 22   | MC   | 1      | CCSS.Math.Content.6.EE.A.2a |
| 24   | MC   | 1      | CCSS.Math.Content.6.EE.A.2b |
| 26   | MC   | 1      | CCSS.Math.Content.6.EE.A.3  |
| 27   | MC   | 1      | CCSS.Math.Content.6.RP.A.2  |
| 28   | MC   | 1      | CCSS.Math.Content.6.RP.A.3b |
| 29   | MC   | 1      | CCSS.Math.Content.6.EE.B.7  |
| 30   | MC   | 1      | CCSS.Math.Content.6.G.A.1   |
| 31   | MC   | 1      | CCSS.Math.Content.6.EE.B.7  |
| 33   | MC   | 1      | CCSS.Math.Content.6.G.A.3   |
| 34   | MC   | 1      | CCSS.Math.Content.6.RP.A.3a |
| 35   | MC   | 1      | CCSS.Math.Content.6.EE.A.4  |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 36   | MC   | 1      | CCSS.Math.Content.6.RP.A.1  |
| 37   | MC   | 1      | CCSS.Math.Content.6.NS.C.5  |
| 38   | MC   | 1      | CCSS.Math.Content.6.EE.C.9  |
| 39   | MC   | 1      | CCSS.Math.Content.6.RP.A.3d |
| 40   | MC   | 1      | CCSS.Math.Content.6.NS.C.7a |
| 41   | MC   | 1      | CCSS.Math.Content.6.EE.C.9  |
| 42   | MC   | 1      | CCSS.Math.Content.6.G.A.3   |
| 43   | MC   | 1      | CCSS.Math.Content.6.RP.A.3c |
| 44   | MC   | 1      | CCSS.Math.Content.6.NS.A.1  |
| 45   | MC   | 1      | CCSS.Math.Content.6.G.A.4   |
| 46   | MC   | 1      | CCSS.Math.Content.6.EE.A.2a |
| 47   | MC   | 1      | CCSS.Math.Content.6.RP.A.3a |
| 48   | MC   | 1      | CCSS.Math.Content.6.EE.B.5  |
| 49   | MC   | 1      | CCSS.Math.Content.6.RP.A.3b |
| 52   | CR   | 2      | CCSS.Math.Content.6.NS.C.8  |
| 53   | CR   | 2      | CCSS.Math.Content.6.NS.B.4  |
| 54   | CR   | 2      | CCSS.Math.Content.6.EE.A.1  |
| 55   | CR   | 2      | CCSS.Math.Content.6.G.A.1   |
| 56   | CR   | 2      | CCSS.Math.Content.6.NS.C.8  |
| 57   | CR   | 2      | CCSS.Math.Content.6.G.A.2   |
| 58   | CR   | 3      | CCSS.Math.Content.6.EE.A.3  |
| 59   | CR   | 3      | CCSS.Math.Content.6.EE.B.7  |
| 60   | CR   | 3      | CCSS.Math.Content.6.RP.A.2  |
| 61   | CR   | 3      | CCSS.Math.Content.6.RP.A.3c |

**Table G11. Mathematics Grade 7 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.7.G.A.1   |
| 2    | MC   | 1      | CCSS.Math.Content.7.NS.A.1d |
| 4    | MC   | 1      | CCSS.Math.Content.7.RP.A.1  |
| 6    | MC   | 1      | CCSS.Math.Content.7.EE.A.1  |
| 7    | MC   | 1      | CCSS.Math.Content.7.RP.A.3  |
| 8    | MC   | 1      | CCSS.Math.Content.7.EE.B.4b |
| 9    | MC   | 1      | CCSS.Math.Content.7.SP.B.3  |
| 10   | MC   | 1      | CCSS.Math.Content.7.NS.A.2c |
| 11   | MC   | 1      | CCSS.Math.Content.7.EE.B.4a |
| 12   | MC   | 1      | CCSS.Math.Content.7.SP.A.1  |
| 13   | MC   | 1      | CCSS.Math.Content.7.SP.C.8a |

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 14   | MC   | 1      | CCSS.Math.Content.7.RP.A.2c |
| 15   | MC   | 1      | CCSS.Math.Content.7.NS.A.3  |
| 16   | MC   | 1      | CCSS.Math.Content.7.SP.C.5  |
| 17   | MC   | 1      | CCSS.Math.Content.7.EE.A.2  |
| 18   | MC   | 1      | CCSS.Math.Content.7.RP.A.3  |
| 20   | MC   | 1      | CCSS.Math.Content.7.EE.B.4b |
| 21   | MC   | 1      | CCSS.Math.Content.7.NS.A.2c |
| 22   | MC   | 1      | CCSS.Math.Content.7.EE.B.3  |
| 23   | MC   | 1      | CCSS.Math.Content.7.RP.A.2a |
| 24   | MC   | 1      | CCSS.Math.Content.7.EE.A.1  |
| 25   | MC   | 1      | CCSS.Math.Content.7.EE.B.4a |
| 27   | MC   | 1      | CCSS.Math.Content.7.NS.A.1c |
| 28   | MC   | 1      | CCSS.Math.Content.7.NS.A.2b |
| 29   | MC   | 1      | CCSS.Math.Content.7.EE.A.1  |
| 30   | MC   | 1      | CCSS.Math.Content.7.RP.A.3  |
| 31   | MC   | 1      | CCSS.Math.Content.7.EE.A.1  |
| 33   | MC   | 1      | CCSS.Math.Content.7.EE.B.4a |
| 34   | MC   | 1      | CCSS.Math.Content.7.EE.A.2  |
| 35   | MC   | 1      | CCSS.Math.Content.7.RP.A.3  |
| 36   | MC   | 1      | CCSS.Math.Content.7.SP.C.6  |
| 37   | MC   | 1      | CCSS.Math.Content.7.RP.A.1  |
| 38   | MC   | 1      | CCSS.Math.Content.7.NS.A.3  |
| 39   | MC   | 1      | CCSS.Math.Content.7.RP.A.2a |
| 40   | MC   | 1      | CCSS.Math.Content.7.EE.A.1  |
| 41   | MC   | 1      | CCSS.Math.Content.7.RP.A.2b |
| 42   | MC   | 1      | CCSS.Math.Content.7.EE.A.2  |
| 43   | MC   | 1      | CCSS.Math.Content.7.RP.A.1  |
| 44   | MC   | 1      | CCSS.Math.Content.7.EE.B.4a |
| 45   | MC   | 1      | CCSS.Math.Content.7.RP.A.3  |
| 46   | MC   | 1      | CCSS.Math.Content.7.G.A.1   |
| 47   | MC   | 1      | CCSS.Math.Content.7.EE.B.3  |
| 48   | MC   | 1      | CCSS.Math.Content.7.SP.B.4  |
| 49   | MC   | 1      | CCSS.Math.Content.7.G.B.4   |
| 52   | CR   | 2      | CCSS.Math.Content.7.SP.C.6  |
| 53   | CR   | 2      | CCSS.Math.Content.7.RP.A.3  |
| 54   | CR   | 2      | CCSS.Math.Content.7.EE.B.4a |
| 55   | CR   | 2      | CCSS.Math.Content.7.SP.A.2  |
| 56   | CR   | 2      | CCSS.Math.Content.7.G.B.4   |



| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 57   | CR   | 2      | CCSS.Math.Content.7.NS.A.3  |
| 58   | CR   | 3      | CCSS.Math.Content.7.RP.A.2a |
| 59   | CR   | 3      | CCSS.Math.Content.7.EE.B.3  |
| 60   | CR   | 3      | CCSS.Math.Content.7.RP.A.3  |
| 61   | CR   | 3      | CCSS.Math.Content.7.NS.A.3  |

**Table G12. Mathematics Grade 8 Operational Item Map**

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 1    | MC   | 1      | CCSS.Math.Content.8.EE.C.8c |
| 2    | MC   | 1      | CCSS.Math.Content.8.F.B.4   |
| 3    | MC   | 1      | CCSS.Math.Content.8.EE.A.3  |
| 4    | MC   | 1      | CCSS.Math.Content.8.G.A.2   |
| 5    | MC   | 1      | CCSS.Math.Content.8.EE.C.8b |
| 6    | MC   | 1      | CCSS.Math.Content.8.G.C.9   |
| 7    | MC   | 1      | CCSS.Math.Content.8.F.A.3   |
| 8    | MC   | 1      | CCSS.Math.Content.8.SP.A.1  |
| 9    | MC   | 1      | CCSS.Math.Content.8.EE.B.5  |
| 10   | MC   | 1      | CCSS.Math.Content.8.F.A.3   |
| 11   | MC   | 1      | CCSS.Math.Content.8.EE.A.1  |
| 12   | MC   | 1      | CCSS.Math.Content.8.EE.C.7b |
| 15   | MC   | 1      | CCSS.Math.Content.8.EE.B.6  |
| 16   | MC   | 1      | CCSS.Math.Content.8.F.A.2   |
| 17   | MC   | 1      | CCSS.Math.Content.8.SP.A.3  |
| 19   | MC   | 1      | CCSS.Math.Content.8.EE.A.3  |
| 20   | MC   | 1      | CCSS.Math.Content.8.G.A.4   |
| 21   | MC   | 1      | CCSS.Math.Content.8.F.A.2   |
| 22   | MC   | 1      | CCSS.Math.Content.8.G.A.1a  |
| 24   | MC   | 1      | CCSS.Math.Content.8.F.B.5   |
| 25   | MC   | 1      | CCSS.Math.Content.8.EE.A.4  |
| 26   | MC   | 1      | CCSS.Math.Content.8.F.A.1   |
| 27   | MC   | 1      | CCSS.Math.Content.8.EE.C.8b |
| 28   | MC   | 1      | CCSS.Math.Content.8.G.A.3   |
| 29   | MC   | 1      | CCSS.Math.Content.8.EE.A.3  |
| 30   | MC   | 1      | CCSS.Math.Content.8.F.A.1   |
| 32   | MC   | 1      | CCSS.Math.Content.8.F.B.4   |
| 33   | MC   | 1      | CCSS.Math.Content.8.EE.B.6  |
| 34   | MC   | 1      | CCSS.Math.Content.8.SP.A.4  |
| 35   | MC   | 1      | CCSS.Math.Content.8.G.C.9   |

## Appendix G: Operational Item Maps

| Item | Type | Points | Standard                    |
|------|------|--------|-----------------------------|
| 36   | MC   | 1      | CCSS.Math.Content.8.EE.B.5  |
| 37   | MC   | 1      | CCSS.Math.Content.8.F.A.3   |
| 38   | MC   | 1      | CCSS.Math.Content.8.EE.A.4  |
| 39   | MC   | 1      | CCSS.Math.Content.8.F.B.4   |
| 40   | MC   | 1      | CCSS.Math.Content.8.F.A.2   |
| 41   | MC   | 1      | CCSS.Math.Content.8.SP.A.2  |
| 42   | MC   | 1      | CCSS.Math.Content.8.EE.C.7b |
| 44   | MC   | 1      | CCSS.Math.Content.8.G.C.9   |
| 45   | MC   | 1      | CCSS.Math.Content.8.F.B.5   |
| 46   | MC   | 1      | CCSS.Math.Content.8.EE.C.8a |
| 47   | MC   | 1      | CCSS.Math.Content.8.G.A.5   |
| 48   | MC   | 1      | CCSS.Math.Content.8.EE.B.6  |
| 49   | MC   | 1      | CCSS.Math.Content.8.F.A.2   |
| 50   | MC   | 1      | CCSS.Math.Content.8.EE.C.8b |
| 52   | CR   | 2      | CCSS.Math.Content.8.EE.A.1  |
| 53   | CR   | 2      | CCSS.Math.Content.8.G.A.2   |
| 54   | CR   | 2      | CCSS.Math.Content.8.F.A.3   |
| 55   | CR   | 2      | CCSS.Math.Content.8.EE.C.7a |
| 56   | CR   | 2      | CCSS.Math.Content.8.SP.A.3  |
| 57   | CR   | 2      | CCSS.Math.Content.8.G.A.3   |
| 58   | CR   | 3      | CCSS.Math.Content.8.EE.B.5  |
| 59   | CR   | 3      | CCSS.Math.Content.8.F.B.4   |
| 60   | CR   | 3      | CCSS.Math.Content.8.G.A.4   |
| 61   | CR   | 3      | CCSS.Math.Content.8.EE.C.8c |

## Appendix H: ELA Short-Response Rubric

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### 2-Point Rubric–Short Response

| Score           | Response Features   |
|-----------------|---|
| <b>2 Point</b>  | <p>The features of a 2-point response are</p> <ul style="list-style-type: none"> <li>• Valid inferences and/or claims from the text where required by the prompt</li> <li>• Evidence of analysis of the text where required by the prompt</li> <li>• Relevant facts, definitions, concrete details, and/or other information from the text to develop response according to the requirements of the prompt</li> <li>• Sufficient number of facts, definitions, concrete details, and/or other information from the text as required by the prompt</li> <li>• Complete sentences where errors do not impact readability</li> </ul> |
| <b>1 Point</b>  | <p>The features of a 1-point response are</p> <ul style="list-style-type: none"> <li>• A mostly literal recounting of events or details from the text as required by the prompt</li> <li>• Some relevant facts, definitions, concrete details, and/or other information from the text to develop response according to the requirements of the prompt</li> <li>• Incomplete sentences or bullets</li> </ul>   |
| <b>0 Point*</b> | <p>The features of a 0-point response are</p> <ul style="list-style-type: none"> <li>• A response that does not address any of the requirements of the prompt or is totally inaccurate</li> <li>• A response that is not written in English</li> <li>• A response that is unintelligible or indecipherable</li> </ul>   |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

- If the prompt requires two texts and the student only references one text, the response can be scored no higher than a 1.

## Appendix I: ELA Extended-Response Rubric

### New York State Grade 3 Expository Writing Evaluation Rubric

| CRITERIA   | CCLS        | SCORE   |   |  |  |  |
|--|-------------|---|---|--|--|--|
|  |             | 4<br>Essays at this level:  | 3<br>Essays at this level:  | 2<br>Essays at this level:   | 1<br>Essays at this level:   | 0*<br>Essays at this level:  |
| <b>CONTENT AND ANALYSIS:</b> the extent to which the essay conveys ideas and information clearly and accurately in order to support analysis of topics or text                     | W.2, R.1–9  | –clearly introduce a topic in a manner that follows logically from the task and purpose<br><br>–demonstrate comprehension and analysis of the text  | –clearly introduce a topic in a manner that follows from the task and purpose<br><br>–demonstrate grade-appropriate comprehension of the text   | –introduce a topic in a manner that follows generally from the task and purpose<br><br>–demonstrate a confused comprehension of the text   | –introduce a topic in a manner that does not logically follow from the task and purpose<br><br>–demonstrate little understanding of the text   | –demonstrate a lack of comprehension of the text or task                           |
| <b>COMMAND OF EVIDENCE:</b> the extent to which the essay presents evidence from the provided text to support analysis and reflection  | W.2 R.1–8   | –develop the topic with relevant, well-chosen facts, definitions, and details throughout the essay  | –develop the topic with relevant facts, definitions, and details throughout the essay   | –partially develop the topic of the essay with the use of some textual evidence, some of which may be irrelevant   | –demonstrate an attempt to use evidence, but only develop ideas with minimal, occasional evidence which is generally invalid or irrelevant   | –provide no evidence or provide evidence that is completely irrelevant             |
| <b>COHERENCE, ORGANIZATION, AND STYLE:</b> the extent to which the essay logically organizes complex ideas, concepts, and information using formal style and precise language      | W.2 L.3 L.6 | –clearly and consistently group related information together<br><br>–skillfully connect ideas within categories of information using linking words and phrases<br><br>–provide a concluding statement that follows clearly from the topic and information presented | –generally group related information together<br><br>–connect ideas within categories of information using linking words and phrases<br><br>–provide a concluding statement that follows from the topic and information presented | –exhibit some attempt to group related information together<br><br>–inconsistently connect ideas using some linking words and phrases<br><br>–provide a concluding statement that follows generally from the topic and information presented | –exhibit little attempt at organization<br><br>–lack the use of linking words and phrases<br><br>–provide a concluding statement that is illogical or unrelated to the topic and information presented | –exhibit no evidence of organization<br><br>–do not provide a concluding statement |
| <b>CONTROL OF CONVENTIONS:</b> the extent to which the essay demonstrates command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling | W.2 L.1 L.2 | –demonstrate grade-appropriate command of conventions, with few errors  | –demonstrate grade-appropriate command of conventions, with occasional errors that do not hinder comprehension  | –demonstrate emerging command of conventions, with some errors that may hinder comprehension   | –demonstrate a lack of command of conventions, with frequent errors that hinder comprehension  | –are minimal, making assessment of conventions unreliable                          |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

- If the student writes only a personal response and makes no reference to the text(s), the response can be scored no higher than a 1.
- Responses totally unrelated to the topic, illegible, or incoherent should be given a 0.
- A response totally copied from the text(s) with no original student writing should be scored a 0.

## New York State Grade 4-5 Expository Writing Evaluation Rubric

| CRITERIA   | CCLS                | SCORE   |   |   |   |  |
|--|---------------------|---|---|---|---|--|
|  |                     | 4<br>Essays at this level:  | 3<br>Essays at this level:  | 2<br>Essays at this level:  | 1<br>Essays at this level:  | 0*<br>Essays at this level:  |
| <b>CONTENT AND ANALYSIS:</b> the extent to which the essay conveys ideas and information clearly and accurately in order to support an analysis of topics or texts                 | W.2<br>R.1–9        | – clearly introduce a topic in a manner that follows logically from the task and purpose<br><br>– demonstrate insightful comprehension and analysis of the text(s)  | – clearly introduce a topic in a manner that follows from the task and purpose<br><br>– demonstrate grade-appropriate comprehension and analysis of the text(s)   | – introduce a topic in a manner that follows generally from the task and purpose<br><br>– demonstrate a literal comprehension of the text(s)  | – introduce a topic in a manner that does not logically follow from the task and purpose<br><br>– demonstrate little understanding of the text(s)   | – demonstrate a lack of comprehension of the text(s) or task   |
| <b>COMMAND OF EVIDENCE:</b> the extent to which the essay presents evidence from the provided texts to support analysis and reflection   | W.2<br>W.9<br>R.1–9 | – develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples from the text(s)<br><br>– sustain the use of varied, relevant evidence   | – develop the topic with relevant facts, definitions, details, quotations, or other information and examples from the text(s)<br><br>– sustain the use of relevant evidence, with some lack of variety  | – partially develop the topic of the essay with the use of some textual evidence, some of which may be irrelevant<br><br>– use relevant evidence with inconsistency   | – demonstrate an attempt to use evidence, but only develop ideas with minimal, occasional evidence which is generally invalid or irrelevant   | – provide no evidence or provide evidence that is completely irrelevant  |
| <b>COHERENCE, ORGANIZATION, AND STYLE:</b> the extent to which the essay logically organizes complex ideas, concepts, and information using formal style and precise language      | W.2<br>L.3<br>L.6   | – exhibit clear, purposeful organization<br><br>– skillfully link ideas using grade-appropriate words and phrases<br><br>– use grade-appropriate, stylistically sophisticated language and domain-specific vocabulary<br><br>– provide a concluding statement that follows clearly from the topic and information presented | – exhibit clear organization<br><br>– link ideas using grade-appropriate words and phrases<br><br>– use grade-appropriate precise language and domain-specific vocabulary<br><br>– provide a concluding statement that follows from the topic and information presented | – exhibit some attempt at organization<br><br>– inconsistently link ideas using words and phrases<br><br>– inconsistently use appropriate language and domain-specific vocabulary<br><br>– provide a concluding statement that follows generally from the topic and information presented | – exhibit little attempt at organization, or attempts to organize are irrelevant to the task<br><br>– lack the use of linking words and phrases<br><br>– use language that is imprecise or inappropriate for the text(s) and task<br><br>– provide a concluding statement that is illogical or unrelated to the topic and information presented | – exhibit no evidence of organization<br><br>– exhibit no use of linking words and phrases<br><br>– use language that is predominantly incoherent or copied directly from the text(s)<br><br>– do not provide a concluding statement |
| <b>CONTROL OF CONVENTIONS:</b> the extent to which the essay demonstrates command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling | W.2<br>L.1<br>L.2   | – demonstrate grade-appropriate command of conventions, with few errors   | – demonstrate grade-appropriate command of conventions, with occasional errors that do not hinder comprehension   | – demonstrate emerging command of conventions, with some errors that may hinder comprehension   | – demonstrate a lack of command of conventions, with frequent errors that hinder comprehension  | – are minimal, making assessment of conventions unreliable   |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

- If the prompt requires two texts and the student only references one text, the response can be scored no higher than a 2.
- If the student writes only a personal response and makes no reference to the text(s), the response can be scored no higher than a 1.
- Responses totally unrelated to the topic, illegible, or incoherent should be given a 0.
- A response totally copied from the text(s) with no original student writing should be scored a 0.

## New York State Grade 6-8 Expository Writing Evaluation Rubric

| CRITERIA   | CCLS          | SCORE  |  |   |   |   |
|--|---------------|--|--|---|---|---|
|  |               | 4<br>Essays at this level:   | 3<br>Essays at this level:   | 2<br>Essays at this level:  | 1<br>Essays at this level:  | 0*<br>Essays at this level:   |
| <b>CONTENT AND ANALYSIS:</b> the extent to which the essay conveys complex ideas and information clearly and accurately in order to support claims in an analysis of topics or texts | W.2, R.1-9    | –clearly introduce a topic in a manner that is compelling and follows logically from the task and purpose<br><br>–demonstrate insightful analysis of the text(s)   | – clearly introduce a topic in a manner that follows from the task and purpose<br><br>–demonstrate grade-appropriate analysis of the text(s)   | –introduce a topic in a manner that follows generally from the task and purpose<br><br>–demonstrate a literal comprehension of the text(s)  | –introduce a topic in a manner that does not logically follow from the task and purpose<br><br>–demonstrate little understanding of the text(s)   | –demonstrate a lack of comprehension of the text(s) or task   |
| <b>COMMAND OF EVIDENCE:</b> the extent to which the essay presents evidence from the provided texts to support analysis and reflection   | W.9, R.1-9    | –develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples from the text(s)<br><br>–sustain the use of varied, relevant evidence  | –develop the topic with relevant facts, definitions, details, quotations, or other information and examples from the text(s)<br><br>–sustain the use of relevant evidence, with some lack of variety   | –partially develop the topic of the essay with the use of some textual evidence, some of which may be irrelevant<br><br>–use relevant evidence with inconsistency   | –demonstrate an attempt to use evidence, but only develop ideas with minimal, occasional evidence which is generally invalid or irrelevant  | –provide no evidence or provide evidence that is completely irrelevant  |
| <b>COHERENCE, ORGANIZATION, AND STYLE:</b> the extent to which the essay logically organizes complex ideas, concepts, and information using formal style and precise language        | W.2, L.3, L.6 | –exhibit clear organization, with the skillful use of appropriate and varied transitions to create a unified whole and enhance meaning<br><br>–establish and maintain a formal style, using grade-appropriate, stylistically sophisticated language and domain-specific vocabulary with a notable sense of voice<br><br>–provide a concluding statement or section that is compelling and follows clearly from the topic and information presented | –exhibit clear organization, with the use of appropriate transitions to create a unified whole<br><br>–establish and maintain a formal style using precise language and domain-specific vocabulary<br><br>–provide a concluding statement or section that follows from the topic and information presented | –exhibit some attempt at organization, with inconsistent use of transitions<br><br>–establish but fail to maintain a formal style, with inconsistent use of language and domain-specific vocabulary<br><br>–provide a concluding statement or section that follows generally from the topic and information presented | –exhibit little attempt at organization, or attempts to organize are irrelevant to the task<br><br>–lack a formal style, using language that is imprecise or inappropriate for the text(s) and task<br><br>–provide a concluding statement or section that is illogical or unrelated to the topic and information presented | –exhibit no evidence of organization<br><br>–use language that is predominantly incoherent or copied directly from the text(s)<br><br>–do not provide a concluding statement or section |
| <b>CONTROL OF CONVENTIONS:</b> the extent to which the essay demonstrates command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling   | W.2, L.1, L.2 | –demonstrate grade-appropriate command of conventions, with few errors   | –demonstrate grade-appropriate command of conventions, with occasional errors that do not hinder comprehension   | –demonstrate emerging command of conventions, with some errors that may hinder comprehension  | –demonstrate a lack of command of conventions, with frequent errors that hinder comprehension   | –are minimal, making assessment of conventions unreliable   |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

- If the prompt requires two texts and the student only references one text, the response can be scored no higher than a 2.
- If the student writes only a personal response and makes no reference to the text(s), the response can be scored no higher than a 1.
- Responses totally unrelated to the topic, illegible, or incoherent should be given a 0.
- A response totally copied from the text(s) with no original student writing should be scored a 0.

## Appendix J: Mathematics Short-Response Rubric

### 2-Point Holistic Rubric

|           |  |
|-----------|--|
| 2 Points  | <p>A two-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li> <li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li> <li>• may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding</li> </ul> |
| 1 Point   | <p>A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• correctly addresses only some elements of the task</li> <li>• may contain an incorrect solution but applies a mathematically appropriate process</li> <li>• may contain the correct solution but required work is incomplete</li> </ul>  |
| 0 Points* | <p>A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>   |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

## Appendix K: Mathematics Extended-Response Rubric

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### 3-Point Holistic Rubric

|           |   |
|-----------|---|
| 3 Points  | <p>A three-point response includes the correct solution(s) to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li> <li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li> <li>• may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding</li> </ul>  |
| 2 Points  | <p>A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• appropriately addresses most, but not all, aspects of the task using mathematically sound procedures</li> <li>• may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations</li> <li>• may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures</li> </ul>  |
| 1 Point   | <p>A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> <li>• may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete</li> <li>• exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning</li> <li>• reflects a lack of essential understanding of the underlying mathematical concepts</li> <li>• may contain the correct solution(s) but required work is limited</li> </ul> |
| 0 Points* | <p>A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>  |

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).



## Appendix L: Factor Analysis Results for Select Subgroups

As described in Section 3: Validity, a principal components factor analysis was conducted on the Grades 3–8 Common Core ELA and Mathematics Tests data. The analyses were conducted for the total population of students and select subgroups: ELL, SWD, SUA, SWD students using disability accommodations (SWD & SUA), and ELL students using ELL-related accommodations (ELL & SUA). Tables L1 and L2 contain the results of factor analysis on the subpopulation data for the Grades 3–8 Common Core ELA and Mathematics Tests, respectively.

**Table L1. ELA Grade 3 Test Factor Analysis by Subgroup**

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y              | 1                | <b>5.92</b>        | <b>17.42</b>           | <b>17.42</b> |
|                      |                    | 2                | 1.48               | 4.36                   | 21.78        |
|                      |                    | 3                | 1.23               | 3.62                   | 25.40        |
|                      |                    | 4                | 1.06               | 3.12                   | 28.53        |
|                      |                    | 5                | 1.04               | 3.05                   | 31.58        |
|                      |                    | 6                | 1.03               | 3.02                   | 34.60        |
|                      |                    | 7                | 1.01               | 2.98                   | 37.58        |
|                      |                    | 8                | 1.00               | 2.96                   | 40.53        |
| SWD                  | All Codes          | 1                | <b>7.33</b>        | <b>21.56</b>           | <b>21.56</b> |
|                      |                    | 2                | 1.49               | 4.38                   | 25.95        |
|                      |                    | 3                | 1.21               | 3.54                   | 29.49        |
|                      |                    | 4                | 1.02               | 2.99                   | 32.48        |
|                      |                    | 5                | 1.01               | 2.96                   | 35.44        |
| SUA                  | All Codes          | 1                | <b>7.19</b>        | <b>21.14</b>           | <b>21.14</b> |
|                      |                    | 2                | 1.50               | 4.42                   | 25.57        |
|                      |                    | 3                | 1.21               | 3.54                   | 29.11        |
|                      |                    | 4                | 1.03               | 3.03                   | 32.14        |
|                      |                    | 5                | 1.01               | 2.98                   | 35.12        |
| SWD/SUA              | SUA=504 plan codes | 1                | <b>6.84</b>        | <b>20.13</b>           | <b>20.13</b> |
|                      |                    | 2                | 1.50               | 4.41                   | 24.54        |
|                      |                    | 3                | 1.21               | 3.55                   | 28.09        |
|                      |                    | 4                | 1.04               | 3.06                   | 31.15        |
|                      |                    | 5                | 1.03               | 3.03                   | 34.18        |
|                      |                    | 6                | 1.00               | 2.96                   | 37.14        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                 | Extracted Factor |                    |                        |              |
|----------------------|-----------------|------------------|--------------------|------------------------|--------------|
|                      |                 | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                 |                  |                    | %                      | Cumulative % |
| ELL/SUA              | SUA & ELL Codes | 1                | 5.12               | 15.07                  | 15.07        |
|                      |                 | 2                | 1.43               | 4.20                   | 19.27        |
|                      |                 | 3                | 1.21               | 3.57                   | 22.84        |
|                      |                 | 4                | 1.14               | 3.36                   | 26.21        |
|                      |                 | 5                | 1.12               | 3.30                   | 29.50        |
|                      |                 | 6                | 1.08               | 3.18                   | 32.68        |
|                      |                 | 7                | 1.07               | 3.14                   | 35.82        |
|                      |                 | 8                | 1.06               | 3.11                   | 38.94        |
|                      |                 | 9                | 1.02               | 2.99                   | 41.92        |
|                      |                 | 10               | 1.01               | 2.96                   | 44.89        |

**Table L2. ELA Grade 4 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | 1                | 5.26               | 15.48                  | 15.48        |
|                      |           | 2                | 1.54               | 4.52                   | 20.00        |
|                      |           | 3                | 1.13               | 3.31                   | 23.31        |
|                      |           | 4                | 1.07               | 3.16                   | 26.47        |
|                      |           | 5                | 1.06               | 3.13                   | 29.60        |
|                      |           | 6                | 1.05               | 3.09                   | 32.69        |
|                      |           | 7                | 1.04               | 3.05                   | 35.73        |
|                      |           | 8                | 1.02               | 3.01                   | 38.74        |
| SWD                  | All Codes | 1                | 6.36               | 18.69                  | 18.69        |
|                      |           | 2                | 1.53               | 4.50                   | 23.20        |
|                      |           | 3                | 1.09               | 3.20                   | 26.39        |
|                      |           | 4                | 1.06               | 3.12                   | 29.51        |
|                      |           | 5                | 1.04               | 3.07                   | 32.58        |
|                      |           | 6                | 1.01               | 2.97                   | 35.55        |
| SUA                  | All Codes | 1                | 6.42               | 18.89                  | 18.89        |
|                      |           | 2                | 1.55               | 4.55                   | 23.44        |
|                      |           | 3                | 1.08               | 3.17                   | 26.61        |
|                      |           | 4                | 1.05               | 3.10                   | 29.71        |
|                      |           | 5                | 1.04               | 3.06                   | 32.77        |
|                      |           | 6                | 1.01               | 2.96                   | 35.73        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD/SUA              | SUA=504 plan codes | 1                | 6.10               | 17.95                  | 17.95        |
|                      |                    | 2                | 1.54               | 4.54                   | 22.48        |
|                      |                    | 3                | 1.09               | 3.22                   | 25.70        |
|                      |                    | 4                | 1.07               | 3.14                   | 28.84        |
|                      |                    | 5                | 1.05               | 3.09                   | 31.94        |
|                      |                    | 6                | 1.02               | 3.00                   | 34.94        |
|                      |                    | 7                | 1.01               | 2.97                   | 37.91        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 4.71               | 13.87                  | 13.87        |
|                      |                    | 2                | 1.48               | 4.35                   | 18.22        |
|                      |                    | 3                | 1.18               | 3.46                   | 21.68        |
|                      |                    | 4                | 1.15               | 3.39                   | 25.07        |
|                      |                    | 5                | 1.13               | 3.33                   | 28.40        |
|                      |                    | 6                | 1.10               | 3.22                   | 31.63        |
|                      |                    | 7                | 1.08               | 3.17                   | 34.80        |
|                      |                    | 8                | 1.06               | 3.11                   | 37.91        |
|                      |                    | 9                | 1.05               | 3.08                   | 40.98        |
|                      |                    | 10               | 1.02               | 3.00                   | 43.98        |
|                      |                    | 11               | 1.02               | 2.99                   | 46.97        |

**Table L3. ELA Grade 5 Test Factor Analysis by Subgroup**

| Demographic Category |       | Extracted Factor |                    |                        |              |
|----------------------|-------|------------------|--------------------|------------------------|--------------|
|                      |       | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |       |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y | 1                | 6.44               | 14.64                  | 14.64        |
|                      |       | 2                | 1.69               | 3.83                   | 18.48        |
|                      |       | 3                | 1.25               | 2.84                   | 21.32        |
|                      |       | 4                | 1.13               | 2.56                   | 23.88        |
|                      |       | 5                | 1.09               | 2.47                   | 26.35        |
|                      |       | 6                | 1.08               | 2.45                   | 28.80        |
|                      |       | 7                | 1.05               | 2.40                   | 31.20        |
|                      |       | 8                | 1.04               | 2.36                   | 33.56        |
|                      |       | 9                | 1.03               | 2.34                   | 35.90        |
|                      |       | 10               | 1.02               | 2.33                   | 38.23        |
|                      |       | 11               | 1.00               | 2.28                   | 40.50        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD                  | All Codes          | <b>1</b>         | <b>7.78</b>        | <b>17.69</b>           | <b>17.69</b> |
|                      |                    | 2                | 1.73               | 3.93                   | 21.61        |
|                      |                    | 3                | 1.26               | 2.86                   | 24.47        |
|                      |                    | 4                | 1.10               | 2.49                   | 26.96        |
|                      |                    | 5                | 1.04               | 2.37                   | 29.33        |
|                      |                    | 6                | 1.02               | 2.32                   | 31.65        |
|                      |                    | 7                | 1.01               | 2.29                   | 33.94        |
|                      |                    | 8                | 1.00               | 2.28                   | 36.22        |
| SUA                  | All Codes          | <b>1</b>         | <b>7.98</b>        | <b>18.14</b>           | <b>18.14</b> |
|                      |                    | 2                | 1.73               | 3.93                   | 22.06        |
|                      |                    | 3                | 1.26               | 2.85                   | 24.91        |
|                      |                    | 4                | 1.09               | 2.48                   | 27.40        |
|                      |                    | 5                | 1.04               | 2.36                   | 29.76        |
|                      |                    | 6                | 1.02               | 2.31                   | 32.07        |
|                      |                    | 7                | 1.00               | 2.28                   | 34.35        |
| SWD/SUA              | SUA=504 plan codes | <b>1</b>         | <b>7.51</b>        | <b>17.06</b>           | <b>17.06</b> |
|                      |                    | 2                | 1.72               | 3.92                   | 20.97        |
|                      |                    | 3                | 1.25               | 2.84                   | 23.82        |
|                      |                    | 4                | 1.11               | 2.52                   | 26.33        |
|                      |                    | 5                | 1.05               | 2.39                   | 28.73        |
|                      |                    | 6                | 1.03               | 2.35                   | 31.07        |
|                      |                    | 7                | 1.01               | 2.31                   | 33.38        |
|                      |                    | 8                | 1.01               | 2.29                   | 35.67        |
|                      |                    | 9                | 1.00               | 2.28                   | 37.95        |
| ELL/SUA              | SUA & ELL Codes    | <b>1</b>         | <b>5.62</b>        | <b>12.78</b>           | <b>12.78</b> |
|                      |                    | 2                | 1.57               | 3.58                   | 16.35        |
|                      |                    | 3                | 1.24               | 2.82                   | 19.17        |
|                      |                    | 4                | 1.19               | 2.71                   | 21.89        |
|                      |                    | 5                | 1.17               | 2.65                   | 24.53        |
|                      |                    | 6                | 1.14               | 2.58                   | 27.12        |
|                      |                    | 7                | 1.11               | 2.53                   | 29.64        |
|                      |                    | 8                | 1.10               | 2.50                   | 32.14        |
|                      |                    | 9                | 1.09               | 2.47                   | 34.61        |
|                      |                    | 10               | 1.07               | 2.43                   | 37.03        |
|                      |                    | 11               | 1.03               | 2.35                   | 39.38        |
|                      |                    | 12               | 1.03               | 2.34                   | 41.73        |
|                      |                    | 13               | 1.02               | 2.33                   | 44.06        |
|                      |                    | 14               | 1.02               | 2.31                   | 46.37        |
|                      |                    | 15               | 1.01               | 2.30                   | 48.67        |

# Appendix L: Factor Analysis Results for Select Subgroups

**Table L4. ELA Grade 6 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | <b>1</b>         | <b>5.93</b>        | <b>13.48</b>           | <b>13.48</b> |
|                      |           | 2                | 1.58               | 3.60                   | 17.07        |
|                      |           | 3                | 1.19               | 2.70                   | 19.78        |
|                      |           | 4                | 1.13               | 2.57                   | 22.35        |
|                      |           | 5                | 1.12               | 2.55                   | 24.90        |
|                      |           | 6                | 1.10               | 2.51                   | 27.41        |
|                      |           | 7                | 1.10               | 2.50                   | 29.91        |
|                      |           | 8                | 1.09               | 2.48                   | 32.39        |
|                      |           | 9                | 1.08               | 2.45                   | 34.84        |
|                      |           | 10               | 1.07               | 2.43                   | 37.26        |
|                      |           | 11               | 1.06               | 2.42                   | 39.68        |
|                      |           | 12               | 1.03               | 2.35                   | 42.03        |
|                      |           | 13               | 1.02               | 2.31                   | 44.34        |
|                      |           | 14               | 1.00               | 2.28                   | 46.62        |
| SWD                  | All Codes | <b>1</b>         | <b>6.73</b>        | <b>15.29</b>           | <b>15.29</b> |
|                      |           | 2                | 1.66               | 3.77                   | 19.06        |
|                      |           | 3                | 1.16               | 2.64                   | 21.70        |
|                      |           | 4                | 1.15               | 2.62                   | 24.31        |
|                      |           | 5                | 1.08               | 2.45                   | 26.77        |
|                      |           | 6                | 1.07               | 2.43                   | 29.20        |
|                      |           | 7                | 1.05               | 2.40                   | 31.59        |
|                      |           | 8                | 1.04               | 2.37                   | 33.97        |
|                      |           | 9                | 1.03               | 2.35                   | 36.32        |
|                      |           | 10               | 1.02               | 2.32                   | 38.64        |
|                      |           | 11               | 1.02               | 2.31                   | 40.94        |
| SUA                  | All Codes | <b>1</b>         | <b>7.00</b>        | <b>15.91</b>           | <b>15.91</b> |
|                      |           | 2                | 1.67               | 3.79                   | 19.70        |
|                      |           | 3                | 1.16               | 2.63                   | 22.33        |
|                      |           | 4                | 1.15               | 2.61                   | 24.94        |
|                      |           | 5                | 1.07               | 2.44                   | 27.38        |
|                      |           | 6                | 1.06               | 2.41                   | 29.79        |
|                      |           | 7                | 1.05               | 2.40                   | 32.19        |
|                      |           | 8                | 1.04               | 2.36                   | 34.54        |
|                      |           | 9                | 1.03               | 2.34                   | 36.88        |
|                      |           | 10               | 1.02               | 2.31                   | 39.20        |
|                      |           | 11               | 1.01               | 2.30                   | 41.50        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD/SUA              | SUA=504 plan codes | 1                | 6.54               | 14.87                  | 14.87        |
|                      |                    | 2                | 1.66               | 3.76                   | 18.63        |
|                      |                    | 3                | 1.16               | 2.64                   | 21.27        |
|                      |                    | 4                | 1.15               | 2.62                   | 23.89        |
|                      |                    | 5                | 1.08               | 2.45                   | 26.35        |
|                      |                    | 6                | 1.07               | 2.44                   | 28.78        |
|                      |                    | 7                | 1.06               | 2.42                   | 31.20        |
|                      |                    | 8                | 1.05               | 2.40                   | 33.60        |
|                      |                    | 9                | 1.04               | 2.36                   | 35.96        |
|                      |                    | 10               | 1.03               | 2.34                   | 38.30        |
|                      |                    | 11               | 1.03               | 2.33                   | 40.64        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 5.01               | 11.39                  | 11.39        |
|                      |                    | 2                | 1.49               | 3.39                   | 14.77        |
|                      |                    | 3                | 1.24               | 2.82                   | 17.59        |
|                      |                    | 4                | 1.21               | 2.75                   | 20.35        |
|                      |                    | 5                | 1.18               | 2.69                   | 23.03        |
|                      |                    | 6                | 1.16               | 2.65                   | 25.68        |
|                      |                    | 7                | 1.15               | 2.62                   | 28.30        |
|                      |                    | 8                | 1.13               | 2.57                   | 30.87        |
|                      |                    | 9                | 1.11               | 2.52                   | 33.39        |
|                      |                    | 10               | 1.10               | 2.51                   | 35.90        |
|                      |                    | 11               | 1.08               | 2.46                   | 38.35        |
|                      |                    | 12               | 1.07               | 2.44                   | 40.79        |
|                      |                    | 13               | 1.05               | 2.39                   | 43.19        |
|                      |                    | 14               | 1.04               | 2.36                   | 45.55        |
|                      |                    | 15               | 1.02               | 2.33                   | 47.88        |
|                      |                    | 16               | 1.02               | 2.32                   | 50.20        |
|                      |                    | 17               | 1.01               | 2.31                   | 52.50        |

# Appendix L: Factor Analysis Results for Select Subgroups

**Table L5. ELA Grade 7 Test Factor Analysis by Subgroup**

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y              | <b>1</b>         | <b>5.74</b>        | <b>13.06</b>           | <b>13.06</b> |
|                      |                    | 2                | 1.66               | 3.76                   | 16.82        |
|                      |                    | 3                | 1.17               | 2.66                   | 19.48        |
|                      |                    | 4                | 1.12               | 2.55                   | 22.03        |
|                      |                    | 5                | 1.12               | 2.53                   | 24.56        |
|                      |                    | 6                | 1.09               | 2.48                   | 27.04        |
|                      |                    | 7                | 1.08               | 2.46                   | 29.50        |
|                      |                    | 8                | 1.08               | 2.45                   | 31.95        |
|                      |                    | 9                | 1.06               | 2.41                   | 34.35        |
|                      |                    | 10               | 1.05               | 2.38                   | 36.73        |
|                      |                    | 11               | 1.03               | 2.34                   | 39.07        |
|                      |                    | 12               | 1.03               | 2.33                   | 41.41        |
|                      |                    | 13               | 1.01               | 2.29                   | 43.70        |
|                      |                    | 14               | 1.00               | 2.28                   | 45.98        |
| SWD                  | All Codes          | <b>1</b>         | <b>7.12</b>        | <b>16.18</b>           | <b>16.18</b> |
|                      |                    | 2                | 1.71               | 3.88                   | 20.06        |
|                      |                    | 3                | 1.14               | 2.59                   | 22.65        |
|                      |                    | 4                | 1.09               | 2.47                   | 25.12        |
|                      |                    | 5                | 1.06               | 2.40                   | 27.52        |
|                      |                    | 6                | 1.04               | 2.37                   | 29.89        |
|                      |                    | 7                | 1.03               | 2.34                   | 32.23        |
|                      |                    | 8                | 1.02               | 2.31                   | 34.54        |
|                      |                    | 9                | 1.00               | 2.28                   | 36.82        |
| SUA                  | All Codes          | <b>1</b>         | <b>7.45</b>        | <b>16.94</b>           | <b>16.94</b> |
|                      |                    | 2                | 1.71               | 3.89                   | 20.83        |
|                      |                    | 3                | 1.14               | 2.59                   | 23.42        |
|                      |                    | 4                | 1.07               | 2.44                   | 25.86        |
|                      |                    | 5                | 1.05               | 2.38                   | 28.24        |
|                      |                    | 6                | 1.03               | 2.35                   | 30.59        |
|                      |                    | 7                | 1.02               | 2.33                   | 32.91        |
| SWD/SUA              | SUA=504 plan codes | <b>1</b>         | <b>6.94</b>        | <b>15.78</b>           | <b>15.78</b> |
|                      |                    | 2                | 1.70               | 3.85                   | 19.63        |
|                      |                    | 3                | 1.14               | 2.59                   | 22.22        |
|                      |                    | 4                | 1.09               | 2.49                   | 24.71        |
|                      |                    | 5                | 1.07               | 2.43                   | 27.13        |
|                      |                    | 6                | 1.05               | 2.38                   | 29.52        |
|                      |                    | 7                | 1.04               | 2.36                   | 31.87        |
|                      |                    | 8                | 1.02               | 2.32                   | 34.19        |
|                      |                    | 9                | 1.01               | 2.29                   | 36.48        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                 | Extracted Factor |                    |                        |              |
|----------------------|-----------------|------------------|--------------------|------------------------|--------------|
|                      |                 | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                 |                  |                    | %                      | Cumulative % |
| ELL/SUA              | SUA & ELL Codes | 1                | 4.92               | 11.18                  | 11.18        |
|                      |                 | 2                | 1.47               | 3.34                   | 14.52        |
|                      |                 | 3                | 1.24               | 2.82                   | 17.33        |
|                      |                 | 4                | 1.19               | 2.72                   | 20.05        |
|                      |                 | 5                | 1.18               | 2.68                   | 22.73        |
|                      |                 | 6                | 1.16               | 2.64                   | 25.37        |
|                      |                 | 7                | 1.14               | 2.60                   | 27.97        |
|                      |                 | 8                | 1.13               | 2.58                   | 30.55        |
|                      |                 | 9                | 1.11               | 2.52                   | 33.07        |
|                      |                 | 10               | 1.08               | 2.46                   | 35.54        |
|                      |                 | 11               | 1.07               | 2.44                   | 37.98        |
|                      |                 | 12               | 1.06               | 2.41                   | 40.39        |
|                      |                 | 13               | 1.05               | 2.38                   | 42.76        |
|                      |                 | 14               | 1.04               | 2.35                   | 45.12        |
|                      |                 | 15               | 1.03               | 2.34                   | 47.46        |
|                      |                 | 16               | 1.02               | 2.32                   | 49.78        |

**Table L6. ELA Grade 8 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | 1                | 6.93               | 15.74                  | 15.74        |
|                      |           | 2                | 1.80               | 4.09                   | 19.84        |
|                      |           | 3                | 1.25               | 2.85                   | 22.69        |
|                      |           | 4                | 1.16               | 2.64                   | 25.33        |
|                      |           | 5                | 1.13               | 2.58                   | 27.91        |
|                      |           | 6                | 1.08               | 2.46                   | 30.37        |
|                      |           | 7                | 1.07               | 2.42                   | 32.79        |
|                      |           | 8                | 1.04               | 2.36                   | 35.15        |
|                      |           | 9                | 1.01               | 2.30                   | 37.45        |
|                      |           | 10               | 1.01               | 2.30                   | 39.75        |
| SWD                  | All Codes | 1                | 8.24               | 18.73                  | 18.73        |
|                      |           | 2                | 1.79               | 4.07                   | 22.80        |
|                      |           | 3                | 1.32               | 3.00                   | 25.80        |
|                      |           | 4                | 1.10               | 2.50                   | 28.29        |
|                      |           | 5                | 1.03               | 2.33                   | 30.63        |
|                      |           | 6                | 1.02               | 2.32                   | 32.94        |
|                      |           | 7                | 1.00               | 2.28                   | 35.22        |



# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SUA                  | All Codes          | 1                | 8.63               | 19.61                  | 19.61        |
|                      |                    | 2                | 1.80               | 4.08                   | 23.69        |
|                      |                    | 3                | 1.33               | 3.02                   | 26.71        |
|                      |                    | 4                | 1.08               | 2.46                   | 29.17        |
|                      |                    | 5                | 1.01               | 2.30                   | 31.47        |
|                      |                    | 6                | 1.01               | 2.29                   | 33.76        |
| SWD/SUA              | SUA=504 plan codes | 1                | 8.02               | 18.22                  | 18.22        |
|                      |                    | 2                | 1.79               | 4.07                   | 22.30        |
|                      |                    | 3                | 1.32               | 3.01                   | 25.31        |
|                      |                    | 4                | 1.10               | 2.49                   | 27.80        |
|                      |                    | 5                | 1.03               | 2.34                   | 30.13        |
|                      |                    | 6                | 1.03               | 2.33                   | 32.47        |
|                      |                    | 7                | 1.01               | 2.30                   | 34.77        |
|                      |                    | 8                | 1.01               | 2.29                   | 37.05        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 5.83               | 13.25                  | 13.25        |
|                      |                    | 2                | 1.69               | 3.83                   | 17.08        |
|                      |                    | 3                | 1.29               | 2.94                   | 20.01        |
|                      |                    | 4                | 1.21               | 2.75                   | 22.77        |
|                      |                    | 5                | 1.18               | 2.67                   | 25.44        |
|                      |                    | 6                | 1.15               | 2.61                   | 28.05        |
|                      |                    | 7                | 1.13               | 2.58                   | 30.63        |
|                      |                    | 8                | 1.11               | 2.53                   | 33.16        |
|                      |                    | 9                | 1.09               | 2.48                   | 35.64        |
|                      |                    | 10               | 1.08               | 2.45                   | 38.08        |
|                      |                    | 11               | 1.06               | 2.41                   | 40.49        |
|                      |                    | 12               | 1.04               | 2.37                   | 42.86        |
|                      |                    | 13               | 1.03               | 2.34                   | 45.20        |
|                      |                    | 14               | 1.02               | 2.32                   | 47.52        |
|                      |                    | 15               | 1.00               | 2.28                   | 49.80        |

**Table L7. Mathematics Grade 3 Test Factor Analysis by Subgroup**

| Demographic Category |       | Extracted Factor |                    |                        |              |
|----------------------|-------|------------------|--------------------|------------------------|--------------|
|                      |       | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |       |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y | 1                | 9.23               | 20.51                  | 20.51        |
|                      |       | 2                | 1.78               | 3.95                   | 24.46        |
|                      |       | 3                | 1.18               | 2.63                   | 27.08        |
|                      |       | 4                | 1.09               | 2.42                   | 29.51        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD                  | All Codes          | 1                | 9.87               | 21.92                  | 21.92        |
|                      |                    | 2                | 1.69               | 3.76                   | 25.69        |
|                      |                    | 3                | 1.18               | 2.63                   | 28.31        |
|                      |                    | 4                | 1.09               | 2.43                   | 30.75        |
|                      |                    | 5                | 1.01               | 2.23                   | 32.98        |
| SUA                  | All Codes          | 1                | 9.48               | 21.06                  | 21.06        |
|                      |                    | 2                | 1.67               | 3.71                   | 24.77        |
|                      |                    | 3                | 1.20               | 2.67                   | 27.44        |
|                      |                    | 4                | 1.10               | 2.43                   | 29.87        |
|                      |                    | 5                | 1.02               | 2.27                   | 32.14        |
| SWD/SUA              | SUA=504 plan codes | 1                | 9.20               | 20.43                  | 20.43        |
|                      |                    | 2                | 1.68               | 3.73                   | 24.17        |
|                      |                    | 3                | 1.21               | 2.69                   | 26.86        |
|                      |                    | 4                | 1.10               | 2.43                   | 29.29        |
|                      |                    | 5                | 1.03               | 2.29                   | 31.58        |
|                      |                    | 6                | 1.00               | 2.23                   | 33.81        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 8.09               | 17.98                  | 17.98        |
|                      |                    | 2                | 1.66               | 3.70                   | 21.68        |
|                      |                    | 3                | 1.23               | 2.73                   | 24.40        |
|                      |                    | 4                | 1.10               | 2.44                   | 26.85        |
|                      |                    | 5                | 1.08               | 2.39                   | 29.24        |
|                      |                    | 6                | 1.06               | 2.35                   | 31.59        |
|                      |                    | 7                | 1.02               | 2.28                   | 33.86        |
|                      |                    | 8                | 1.01               | 2.24                   | 36.11        |

**Table L8. Mathematics Grade 4 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | 1                | 11.51              | 23.97                  | 23.97        |
|                      |           | 2                | 1.49               | 3.11                   | 27.08        |
|                      |           | 3                | 1.27               | 2.64                   | 29.72        |
|                      |           | 4                | 1.19               | 2.48                   | 32.20        |
|                      |           | 5                | 1.07               | 2.23                   | 34.43        |
|                      |           | 6                | 1.01               | 2.11                   | 36.53        |
| SWD                  | All Codes | 1                | 12.15              | 25.31                  | 25.31        |
|                      |           | 2                | 1.38               | 2.87                   | 28.18        |
|                      |           | 3                | 1.21               | 2.53                   | 30.70        |
|                      |           | 4                | 1.18               | 2.46                   | 33.16        |
|                      |           | 5                | 1.04               | 2.16                   | 35.32        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SUA                  | All Codes          | 1                | 12.16              | 25.33                  | 25.33        |
|                      |                    | 2                | 1.37               | 2.86                   | 28.19        |
|                      |                    | 3                | 1.22               | 2.54                   | 30.73        |
|                      |                    | 4                | 1.18               | 2.46                   | 33.19        |
|                      |                    | 5                | 1.03               | 2.15                   | 35.34        |
| SWD/SUA              | SUA=504 plan codes | 1                | 11.58              | 24.13                  | 24.13        |
|                      |                    | 2                | 1.39               | 2.89                   | 27.02        |
|                      |                    | 3                | 1.23               | 2.56                   | 29.59        |
|                      |                    | 4                | 1.18               | 2.46                   | 32.05        |
|                      |                    | 5                | 1.06               | 2.20                   | 34.25        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 9.18               | 19.13                  | 19.13        |
|                      |                    | 2                | 1.51               | 3.15                   | 22.27        |
|                      |                    | 3                | 1.30               | 2.71                   | 24.98        |
|                      |                    | 4                | 1.22               | 2.53                   | 27.51        |
|                      |                    | 5                | 1.17               | 2.43                   | 29.94        |
|                      |                    | 6                | 1.09               | 2.27                   | 32.21        |
|                      |                    | 7                | 1.05               | 2.20                   | 34.40        |
|                      |                    | 8                | 1.02               | 2.12                   | 36.53        |
|                      |                    | 9                | 1.01               | 2.10                   | 38.62        |

**Table L9. Mathematics Grade 5 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | 1                | 8.89               | 18.91                  | 18.91        |
|                      |           | 2                | 1.96               | 4.17                   | 23.08        |
|                      |           | 3                | 1.14               | 2.42                   | 25.50        |
|                      |           | 4                | 1.11               | 2.36                   | 27.86        |
|                      |           | 5                | 1.07               | 2.27                   | 30.13        |
|                      |           | 6                | 1.01               | 2.15                   | 32.28        |
| SWD                  | All Codes | 1                | 9.64               | 20.51                  | 20.51        |
|                      |           | 2                | 1.89               | 4.02                   | 24.53        |
|                      |           | 3                | 1.10               | 2.35                   | 26.88        |
|                      |           | 4                | 1.06               | 2.25                   | 29.13        |
|                      |           | 5                | 1.04               | 2.22                   | 31.34        |
| SUA                  | All Codes | 1                | 9.79               | 20.84                  | 20.84        |
|                      |           | 2                | 1.89               | 4.01                   | 24.85        |
|                      |           | 3                | 1.10               | 2.35                   | 27.20        |
|                      |           | 4                | 1.05               | 2.24                   | 29.44        |
|                      |           | 5                | 1.04               | 2.20                   | 31.64        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD/SUA              | SUA=504 plan codes | 1                | 9.15               | 19.46                  | 19.46        |
|                      |                    | 2                | 1.86               | 3.97                   | 23.43        |
|                      |                    | 3                | 1.11               | 2.36                   | 25.79        |
|                      |                    | 4                | 1.06               | 2.27                   | 28.06        |
|                      |                    | 5                | 1.05               | 2.23                   | 30.28        |
| ELL/SUA              | SUA & ELL Codes    | 1                | 7.01               | 14.91                  | 14.91        |
|                      |                    | 2                | 1.72               | 3.65                   | 18.56        |
|                      |                    | 3                | 1.21               | 2.57                   | 21.13        |
|                      |                    | 4                | 1.15               | 2.45                   | 23.58        |
|                      |                    | 5                | 1.13               | 2.40                   | 25.98        |
|                      |                    | 6                | 1.10               | 2.33                   | 28.31        |
|                      |                    | 7                | 1.06               | 2.26                   | 30.57        |
|                      |                    | 8                | 1.05               | 2.24                   | 32.81        |
|                      |                    | 9                | 1.05               | 2.22                   | 35.03        |
|                      |                    | 10               | 1.03               | 2.20                   | 37.23        |
|                      |                    | 11               | 1.01               | 2.15                   | 39.38        |

**Table L10. Mathematics Grade 6 Test Factor Analysis by Subgroup**

| Demographic Category |           | Extracted Factor |                    |                        |              |
|----------------------|-----------|------------------|--------------------|------------------------|--------------|
|                      |           | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |           |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y     | 1                | 8.11               | 15.31                  | 15.31        |
|                      |           | 2                | 1.81               | 3.42                   | 18.73        |
|                      |           | 3                | 1.13               | 2.13                   | 20.86        |
|                      |           | 4                | 1.09               | 2.05                   | 22.91        |
|                      |           | 5                | 1.07               | 2.02                   | 24.92        |
|                      |           | 6                | 1.06               | 2.00                   | 26.92        |
|                      |           | 7                | 1.03               | 1.95                   | 28.87        |
|                      |           | 8                | 1.02               | 1.93                   | 30.80        |
|                      |           | 9                | 1.02               | 1.92                   | 32.72        |
| SWD                  | All Codes | 1                | 7.95               | 15.00                  | 15.00        |
|                      |           | 2                | 1.63               | 3.08                   | 18.08        |
|                      |           | 3                | 1.15               | 2.17                   | 20.25        |
|                      |           | 4                | 1.09               | 2.05                   | 22.30        |
|                      |           | 5                | 1.06               | 2.00                   | 24.30        |
|                      |           | 6                | 1.04               | 1.96                   | 26.26        |
|                      |           | 7                | 1.02               | 1.93                   | 28.19        |
|                      |           | 8                | 1.02               | 1.92                   | 30.12        |
|                      |           | 9                | 1.01               | 1.91                   | 32.03        |
|                      |           | 10               | 1.00               | 1.89                   | 33.91        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SUA                  | All Codes          | <b>1</b>         | <b>8.41</b>        | <b>15.87</b>           | <b>15.87</b> |
|                      |                    | 2                | 1.63               | 3.07                   | 18.94        |
|                      |                    | 3                | 1.16               | 2.18                   | 21.12        |
|                      |                    | 4                | 1.08               | 2.04                   | 23.16        |
|                      |                    | 5                | 1.06               | 1.99                   | 25.15        |
|                      |                    | 6                | 1.03               | 1.94                   | 27.09        |
|                      |                    | 7                | 1.02               | 1.92                   | 29.01        |
|                      |                    | 8                | 1.01               | 1.91                   | 30.92        |
|                      |                    | 9                | 1.00               | 1.90                   | 32.81        |
| SWD/SUA              | SUA=504 plan codes | <b>1</b>         | <b>7.45</b>        | <b>14.05</b>           | <b>14.05</b> |
|                      |                    | 2                | 1.61               | 3.03                   | 17.09        |
|                      |                    | 3                | 1.16               | 2.18                   | 19.27        |
|                      |                    | 4                | 1.10               | 2.07                   | 21.34        |
|                      |                    | 5                | 1.07               | 2.02                   | 23.36        |
|                      |                    | 6                | 1.05               | 1.97                   | 25.33        |
|                      |                    | 7                | 1.04               | 1.95                   | 27.29        |
|                      |                    | 8                | 1.03               | 1.95                   | 29.24        |
|                      |                    | 9                | 1.03               | 1.93                   | 31.17        |
|                      |                    | 10               | 1.01               | 1.91                   | 33.08        |
|                      |                    | 11               | 1.00               | 1.89                   | 34.97        |
| ELL/SUA              | SUA & ELL Codes    | <b>1</b>         | <b>5.00</b>        | <b>9.44</b>            | <b>9.44</b>  |
|                      |                    | 2                | 1.57               | 2.96                   | 12.40        |
|                      |                    | 3                | 1.24               | 2.34                   | 14.73        |
|                      |                    | 4                | 1.19               | 2.25                   | 16.99        |
|                      |                    | 5                | 1.19               | 2.24                   | 19.23        |
|                      |                    | 6                | 1.16               | 2.19                   | 21.42        |
|                      |                    | 7                | 1.15               | 2.17                   | 23.59        |
|                      |                    | 8                | 1.14               | 2.16                   | 25.75        |
|                      |                    | 9                | 1.11               | 2.10                   | 27.85        |
|                      |                    | 10               | 1.11               | 2.09                   | 29.93        |
|                      |                    | 11               | 1.10               | 2.07                   | 32.00        |
|                      |                    | 12               | 1.09               | 2.06                   | 34.07        |
|                      |                    | 13               | 1.07               | 2.01                   | 36.08        |
|                      |                    | 14               | 1.06               | 2.00                   | 38.08        |
|                      |                    | 15               | 1.04               | 1.97                   | 40.05        |
|                      |                    | 16               | 1.03               | 1.95                   | 41.99        |
|                      |                    | 17               | 1.03               | 1.93                   | 43.93        |
|                      |                    | 18               | 1.01               | 1.91                   | 45.84        |
|                      |                    | 19               | 1.00               | 1.89                   | 47.73        |

**Table L11. Mathematics Grade 7 Test Factor Analysis by Subgroup**

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y              | <b>1</b>         | <b>8.62</b>        | <b>15.96</b>           | <b>15.96</b> |
|                      |                    | 2                | 1.43               | 2.65                   | 18.60        |
|                      |                    | 3                | 1.20               | 2.22                   | 20.83        |
|                      |                    | 4                | 1.12               | 2.07                   | 22.90        |
|                      |                    | 5                | 1.07               | 1.98                   | 24.88        |
|                      |                    | 6                | 1.06               | 1.96                   | 26.84        |
|                      |                    | 7                | 1.05               | 1.94                   | 28.79        |
|                      |                    | 8                | 1.04               | 1.92                   | 30.70        |
|                      |                    | 9                | 1.02               | 1.90                   | 32.60        |
|                      |                    | 10               | 1.01               | 1.86                   | 34.46        |
| SWD                  | All Codes          | <b>1</b>         | <b>8.37</b>        | <b>15.51</b>           | <b>15.51</b> |
|                      |                    | 2                | 1.39               | 2.57                   | 18.08        |
|                      |                    | 3                | 1.26               | 2.34                   | 20.41        |
|                      |                    | 4                | 1.10               | 2.04                   | 22.45        |
|                      |                    | 5                | 1.07               | 1.97                   | 24.43        |
|                      |                    | 6                | 1.04               | 1.93                   | 26.36        |
|                      |                    | 7                | 1.03               | 1.91                   | 28.27        |
|                      |                    | 8                | 1.01               | 1.87                   | 30.14        |
|                      |                    | 9                | 1.01               | 1.86                   | 32.00        |
| SUA                  | All Codes          | <b>1</b>         | <b>8.99</b>        | <b>16.66</b>           | <b>16.66</b> |
|                      |                    | 2                | 1.41               | 2.61                   | 19.26        |
|                      |                    | 3                | 1.27               | 2.35                   | 21.61        |
|                      |                    | 4                | 1.09               | 2.02                   | 23.63        |
|                      |                    | 5                | 1.06               | 1.96                   | 25.59        |
|                      |                    | 6                | 1.04               | 1.92                   | 27.50        |
|                      |                    | 7                | 1.02               | 1.88                   | 29.39        |
|                      |                    | 8                | 1.00               | 1.86                   | 31.24        |
| SWD/SUA              | SUA=504 plan codes | <b>1</b>         | <b>7.84</b>        | <b>14.51</b>           | <b>14.51</b> |
|                      |                    | 2                | 1.38               | 2.56                   | 17.07        |
|                      |                    | 3                | 1.28               | 2.37                   | 19.44        |
|                      |                    | 4                | 1.11               | 2.06                   | 21.50        |
|                      |                    | 5                | 1.08               | 2.00                   | 23.50        |
|                      |                    | 6                | 1.05               | 1.95                   | 25.45        |
|                      |                    | 7                | 1.04               | 1.93                   | 27.38        |
|                      |                    | 8                | 1.02               | 1.88                   | 29.26        |
|                      |                    | 9                | 1.01               | 1.88                   | 31.14        |
|                      |                    | 10               | 1.01               | 1.87                   | 33.01        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                 | Extracted Factor |                    |                        |              |
|----------------------|-----------------|------------------|--------------------|------------------------|--------------|
|                      |                 | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                 |                  |                    | %                      | Cumulative % |
| ELL/SUA              | SUA & ELL Codes | 1                | 5.03               | 9.31                   | 9.31         |
|                      |                 | 2                | 1.44               | 2.67                   | 11.99        |
|                      |                 | 3                | 1.25               | 2.32                   | 14.31        |
|                      |                 | 4                | 1.22               | 2.26                   | 16.57        |
|                      |                 | 5                | 1.22               | 2.26                   | 18.83        |
|                      |                 | 6                | 1.21               | 2.24                   | 21.07        |
|                      |                 | 7                | 1.18               | 2.19                   | 23.26        |
|                      |                 | 8                | 1.17               | 2.16                   | 25.42        |
|                      |                 | 9                | 1.16               | 2.15                   | 27.56        |
|                      |                 | 10               | 1.13               | 2.09                   | 29.65        |
|                      |                 | 11               | 1.12               | 2.07                   | 31.72        |
|                      |                 | 12               | 1.10               | 2.04                   | 33.76        |
|                      |                 | 13               | 1.09               | 2.01                   | 35.77        |
|                      |                 | 14               | 1.07               | 1.98                   | 37.75        |
|                      |                 | 15               | 1.06               | 1.97                   | 39.72        |
|                      |                 | 16               | 1.05               | 1.94                   | 41.66        |
|                      |                 | 17               | 1.04               | 1.92                   | 43.58        |
|                      |                 | 18               | 1.02               | 1.90                   | 45.48        |
|                      |                 | 19               | 1.02               | 1.89                   | 47.36        |
|                      |                 | 20               | 1.00               | 1.85                   | 49.21        |

**Table L12. Mathematics Grade 8 Test Factor Analysis by Subgroup**

| Demographic Category |       | Extracted Factor |                    |                        |              |
|----------------------|-------|------------------|--------------------|------------------------|--------------|
|                      |       | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |       |                  |                    | %                      | Cumulative % |
| ELL                  | ELL=Y | 1                | 9.63               | 17.84                  | 17.84        |
|                      |       | 2                | 1.48               | 2.75                   | 20.58        |
|                      |       | 3                | 1.24               | 2.30                   | 22.88        |
|                      |       | 4                | 1.15               | 2.14                   | 25.02        |
|                      |       | 5                | 1.10               | 2.04                   | 27.06        |
|                      |       | 6                | 1.06               | 1.97                   | 29.03        |
|                      |       | 7                | 1.05               | 1.94                   | 30.97        |
|                      |       | 8                | 1.03               | 1.91                   | 32.88        |
|                      |       | 9                | 1.02               | 1.89                   | 34.77        |
|                      |       | 10               | 1.01               | 1.87                   | 36.64        |
|                      |       | 11               | 1.00               | 1.86                   | 38.50        |

# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                    | Extracted Factor |                    |                        |              |
|----------------------|--------------------|------------------|--------------------|------------------------|--------------|
|                      |                    | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                    |                  |                    | %                      | Cumulative % |
| SWD                  | All Codes          | <b>1</b>         | <b>8.11</b>        | <b>15.01</b>           | <b>15.01</b> |
|                      |                    | 2                | 1.42               | 2.63                   | 17.64        |
|                      |                    | 3                | 1.30               | 2.41                   | 20.05        |
|                      |                    | 4                | 1.10               | 2.04                   | 22.09        |
|                      |                    | 5                | 1.08               | 2.00                   | 24.10        |
|                      |                    | 6                | 1.06               | 1.96                   | 26.06        |
|                      |                    | 7                | 1.05               | 1.94                   | 28.00        |
|                      |                    | 8                | 1.04               | 1.93                   | 29.93        |
|                      |                    | 9                | 1.03               | 1.92                   | 31.84        |
|                      |                    | 10               | 1.02               | 1.90                   | 33.74        |
|                      |                    | 11               | 1.01               | 1.87                   | 35.61        |
| SUA                  | All Codes          | <b>1</b>         | <b>8.52</b>        | <b>15.78</b>           | <b>15.78</b> |
|                      |                    | 2                | 1.43               | 2.64                   | 18.42        |
|                      |                    | 3                | 1.30               | 2.40                   | 20.82        |
|                      |                    | 4                | 1.09               | 2.03                   | 22.85        |
|                      |                    | 5                | 1.09               | 2.01                   | 24.86        |
|                      |                    | 6                | 1.05               | 1.95                   | 26.81        |
|                      |                    | 7                | 1.04               | 1.93                   | 28.74        |
|                      |                    | 8                | 1.03               | 1.92                   | 30.65        |
|                      |                    | 9                | 1.03               | 1.90                   | 32.55        |
|                      |                    | 10               | 1.01               | 1.87                   | 34.42        |
|                      |                    | 11               | 1.00               | 1.85                   | 36.28        |
| SWD/SUA              | SUA=504 plan codes | <b>1</b>         | <b>7.74</b>        | <b>14.34</b>           | <b>14.34</b> |
|                      |                    | 2                | 1.41               | 2.61                   | 16.95        |
|                      |                    | 3                | 1.30               | 2.41                   | 19.36        |
|                      |                    | 4                | 1.12               | 2.07                   | 21.43        |
|                      |                    | 5                | 1.10               | 2.04                   | 23.47        |
|                      |                    | 6                | 1.07               | 1.97                   | 25.44        |
|                      |                    | 7                | 1.06               | 1.95                   | 27.39        |
|                      |                    | 8                | 1.05               | 1.94                   | 29.33        |
|                      |                    | 9                | 1.04               | 1.93                   | 31.26        |
|                      |                    | 10               | 1.03               | 1.91                   | 33.17        |
|                      |                    | 11               | 1.02               | 1.88                   | 35.05        |
|                      |                    | 12               | 1.01               | 1.87                   | 36.92        |



# Appendix L: Factor Analysis Results for Select Subgroups

| Demographic Category |                 | Extracted Factor |                    |                        |              |
|----------------------|-----------------|------------------|--------------------|------------------------|--------------|
|                      |                 | #                | Initial Eigenvalue | Variance Accounted for |              |
|                      |                 |                  |                    | %                      | Cumulative % |
| ELL/SUA              | SUA & ELL Codes | 1                | 6.03               | 11.17                  | 11.17        |
|                      |                 | 2                | 1.41               | 2.61                   | 13.78        |
|                      |                 | 3                | 1.28               | 2.38                   | 16.16        |
|                      |                 | 4                | 1.26               | 2.33                   | 18.49        |
|                      |                 | 5                | 1.22               | 2.27                   | 20.75        |
|                      |                 | 6                | 1.19               | 2.20                   | 22.95        |
|                      |                 | 7                | 1.18               | 2.18                   | 25.14        |
|                      |                 | 8                | 1.16               | 2.16                   | 27.29        |
|                      |                 | 9                | 1.14               | 2.12                   | 29.41        |
|                      |                 | 10               | 1.12               | 2.08                   | 31.49        |
|                      |                 | 11               | 1.11               | 2.06                   | 33.55        |
|                      |                 | 12               | 1.10               | 2.04                   | 35.58        |
|                      |                 | 13               | 1.09               | 2.02                   | 37.60        |
|                      |                 | 14               | 1.07               | 1.99                   | 39.58        |
|                      |                 | 15               | 1.05               | 1.95                   | 41.53        |
|                      |                 | 16               | 1.03               | 1.91                   | 43.44        |
|                      |                 | 17               | 1.03               | 1.90                   | 45.34        |
|                      |                 | 18               | 1.02               | 1.89                   | 47.23        |
|                      |                 | 19               | 1.01               | 1.87                   | 49.10        |

## Appendix M: Classical Test Theory Statistics

These tables support the classical test theory analyses described in Section 5, “Operational Test Data Collection and Classical Analysis.” They include item type, sample size, p-value, percent of omitted responses and the point-biserial of the key. External linking and field test items (i.e., those not contributing to students’ scores) have been omitted.

**Table M1. ELA Grade 3 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 173,557 | 0.76    | 0.04   | 0.44     |
| 2    | MC   | 173,392 | 0.90    | 0.08   | 0.40     |
| 3    | MC   | 173,388 | 0.57    | 0.10   | 0.43     |
| 4    | MC   | 173,328 | 0.90    | 0.10   | 0.39     |
| 5    | MC   | 173,343 | 0.77    | 0.12   | 0.38     |
| 6    | MC   | 173,273 | 0.52    | 0.13   | 0.42     |
| 13   | MC   | 173,243 | 0.65    | 0.16   | 0.41     |
| 14   | MC   | 173,151 | 0.62    | 0.20   | 0.38     |
| 15   | MC   | 173,197 | 0.45    | 0.19   | 0.33     |
| 16   | MC   | 172,983 | 0.51    | 0.21   | 0.33     |
| 17   | MC   | 173,304 | 0.54    | 0.17   | 0.36     |
| 18   | MC   | 173,254 | 0.53    | 0.18   | 0.30     |
| 19   | MC   | 173,175 | 0.72    | 0.20   | 0.38     |
| 20   | MC   | 173,225 | 0.48    | 0.19   | 0.43     |
| 21   | MC   | 173,214 | 0.52    | 0.21   | 0.42     |
| 22   | MC   | 173,123 | 0.43    | 0.25   | 0.37     |
| 23   | MC   | 173,073 | 0.50    | 0.31   | 0.30     |
| 24   | MC   | 172,908 | 0.68    | 0.42   | 0.46     |
| 25   | MC   | 173,577 | 0.73    | 0.03   | 0.46     |
| 26   | MC   | 173,473 | 0.66    | 0.06   | 0.40     |
| 27   | MC   | 173,365 | 0.34    | 0.09   | 0.39     |
| 28   | MC   | 173,444 | 0.79    | 0.10   | 0.45     |
| 29   | MC   | 173,512 | 0.65    | 0.07   | 0.33     |
| 30   | MC   | 173,410 | 0.57    | 0.11   | 0.43     |
| 31   | MC   | 173,304 | 0.47    | 0.20   | 0.40     |
| 32   | CR2  | 172,801 | 0.61    | 0.51   | 0.56     |
| 33   | CR2  | 172,136 | 0.48    | 0.90   | 0.57     |
| 34   | CR4  | 171,975 | 0.39    | 0.99   | 0.65     |
| 35   | CR2  | 173,397 | 0.53    | 0.17   | 0.62     |
| 36   | CR2  | 172,872 | 0.54    | 0.47   | 0.57     |
| 37   | CR2  | 172,402 | 0.50    | 0.74   | 0.58     |
| 38   | CR2  | 171,801 | 0.47    | 1.09   | 0.57     |
| 39   | CR2  | 171,520 | 0.42    | 1.25   | 0.63     |
| 40   | CR4  | 170,874 | 0.30    | 1.62   | 0.64     |

**Table M2. ELA Grade 4 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 171,124 | 0.55    | 0.02   | 0.38     |
| 2    | MC   | 171,104 | 0.49    | 0.03   | 0.38     |
| 3    | MC   | 170,970 | 0.66    | 0.05   | 0.30     |
| 4    | MC   | 170,974 | 0.54    | 0.06   | 0.24     |
| 5    | MC   | 170,993 | 0.65    | 0.07   | 0.42     |
| 6    | MC   | 170,988 | 0.63    | 0.06   | 0.22     |
| 13   | MC   | 170,985 | 0.41    | 0.07   | 0.29     |
| 14   | MC   | 170,940 | 0.44    | 0.10   | 0.33     |
| 15   | MC   | 170,915 | 0.57    | 0.10   | 0.42     |
| 16   | MC   | 170,922 | 0.55    | 0.11   | 0.40     |
| 17   | MC   | 170,980 | 0.62    | 0.09   | 0.40     |
| 18   | MC   | 170,952 | 0.54    | 0.11   | 0.39     |
| 19   | MC   | 170,784 | 0.46    | 0.19   | 0.25     |
| 20   | MC   | 170,892 | 0.54    | 0.12   | 0.28     |
| 21   | MC   | 170,927 | 0.64    | 0.11   | 0.39     |
| 22   | MC   | 170,867 | 0.43    | 0.14   | 0.25     |
| 23   | MC   | 170,799 | 0.64    | 0.18   | 0.26     |
| 24   | MC   | 170,743 | 0.43    | 0.25   | 0.31     |
| 25   | MC   | 171,110 | 0.70    | 0.03   | 0.38     |
| 26   | MC   | 171,055 | 0.39    | 0.04   | 0.28     |
| 27   | MC   | 170,963 | 0.43    | 0.06   | 0.23     |
| 28   | MC   | 171,020 | 0.39    | 0.07   | 0.30     |
| 29   | MC   | 171,068 | 0.53    | 0.05   | 0.28     |
| 30   | MC   | 171,016 | 0.66    | 0.08   | 0.36     |
| 31   | MC   | 170,894 | 0.70    | 0.15   | 0.39     |
| 32   | CR2  | 170,007 | 0.56    | 0.69   | 0.57     |
| 33   | CR2  | 169,886 | 0.57    | 0.76   | 0.54     |
| 34   | CR4  | 169,098 | 0.43    | 1.22   | 0.66     |
| 35   | CR2  | 170,916 | 0.60    | 0.16   | 0.51     |
| 36   | CR2  | 170,248 | 0.58    | 0.55   | 0.62     |
| 37   | CR2  | 170,574 | 0.75    | 0.36   | 0.56     |
| 38   | CR2  | 170,272 | 0.63    | 0.53   | 0.60     |
| 39   | CR2  | 170,031 | 0.60    | 0.67   | 0.60     |
| 40   | CR4  | 169,851 | 0.45    | 0.78   | 0.70     |

**Table M3. ELA Grade 5 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 160,780 | 0.87    | 0.01   | 0.33     |
| 2    | MC   | 160,535 | 0.62    | 0.04   | 0.40     |
| 3    | MC   | 160,681 | 0.58    | 0.04   | 0.48     |
| 4    | MC   | 160,707 | 0.70    | 0.04   | 0.31     |
| 5    | MC   | 160,708 | 0.51    | 0.03   | 0.26     |
| 6    | MC   | 160,673 | 0.44    | 0.07   | 0.22     |

# Appendix M: Classical Test Theory Statistics

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 7    | MC   | 160,689 | 0.85    | 0.04   | 0.36     |
| 8    | MC   | 160,683 | 0.78    | 0.04   | 0.41     |
| 9    | MC   | 160,595 | 0.74    | 0.11   | 0.36     |
| 10   | MC   | 160,609 | 0.63    | 0.09   | 0.39     |
| 11   | MC   | 160,630 | 0.42    | 0.09   | 0.19     |
| 12   | MC   | 160,673 | 0.48    | 0.07   | 0.35     |
| 13   | MC   | 160,669 | 0.82    | 0.07   | 0.48     |
| 14   | MC   | 160,678 | 0.72    | 0.06   | 0.45     |
| 15   | MC   | 160,624 | 0.52    | 0.09   | 0.22     |
| 16   | MC   | 160,656 | 0.59    | 0.07   | 0.39     |
| 17   | MC   | 160,576 | 0.61    | 0.11   | 0.43     |
| 18   | MC   | 160,597 | 0.74    | 0.10   | 0.44     |
| 19   | MC   | 160,596 | 0.50    | 0.10   | 0.39     |
| 20   | MC   | 160,562 | 0.68    | 0.11   | 0.34     |
| 21   | MC   | 160,583 | 0.52    | 0.12   | 0.34     |
| 29   | MC   | 160,557 | 0.36    | 0.13   | 0.16     |
| 30   | MC   | 160,564 | 0.51    | 0.11   | 0.18     |
| 31   | MC   | 160,473 | 0.49    | 0.16   | 0.30     |
| 32   | MC   | 160,508 | 0.65    | 0.15   | 0.48     |
| 33   | MC   | 160,467 | 0.60    | 0.19   | 0.42     |
| 34   | MC   | 160,538 | 0.56    | 0.15   | 0.36     |
| 35   | MC   | 160,378 | 0.42    | 0.25   | 0.27     |
| 36   | MC   | 160,744 | 0.37    | 0.03   | 0.26     |
| 37   | MC   | 160,712 | 0.72    | 0.03   | 0.17     |
| 38   | MC   | 160,604 | 0.57    | 0.06   | 0.38     |
| 39   | MC   | 160,703 | 0.76    | 0.05   | 0.33     |
| 40   | MC   | 160,644 | 0.66    | 0.04   | 0.46     |
| 41   | MC   | 160,697 | 0.79    | 0.05   | 0.42     |
| 42   | MC   | 160,667 | 0.82    | 0.08   | 0.36     |
| 43   | CR2  | 160,462 | 0.75    | 0.22   | 0.52     |
| 44   | CR2  | 159,941 | 0.64    | 0.54   | 0.58     |
| 45   | CR4  | 159,895 | 0.48    | 0.57   | 0.63     |
| 46   | CR2  | 160,633 | 0.77    | 0.11   | 0.58     |
| 47   | CR2  | 160,224 | 0.69    | 0.36   | 0.55     |
| 48   | CR2  | 160,298 | 0.63    | 0.32   | 0.59     |
| 49   | CR2  | 159,963 | 0.58    | 0.53   | 0.57     |
| 50   | CR2  | 159,801 | 0.66    | 0.63   | 0.65     |
| 51   | CR4  | 159,454 | 0.42    | 0.84   | 0.67     |

**Table M4. ELA Grade 6 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 158,156 | 0.65    | 0.02   | 0.31     |
| 2    | MC   | 158,141 | 0.70    | 0.03   | 0.37     |
| 3    | MC   | 158,108 | 0.67    | 0.03   | 0.45     |
| 4    | MC   | 158,052 | 0.60    | 0.07   | 0.31     |
| 5    | MC   | 158,071 | 0.67    | 0.05   | 0.30     |
| 6    | MC   | 158,115 | 0.73    | 0.03   | 0.46     |
| 7    | MC   | 157,982 | 0.34    | 0.12   | 0.21     |
| 8    | MC   | 158,061 | 0.34    | 0.07   | 0.17     |
| 9    | MC   | 157,949 | 0.53    | 0.14   | 0.25     |
| 10   | MC   | 158,070 | 0.64    | 0.07   | 0.36     |
| 11   | MC   | 157,985 | 0.49    | 0.12   | 0.17     |
| 12   | MC   | 158,069 | 0.72    | 0.06   | 0.41     |
| 13   | MC   | 158,055 | 0.34    | 0.07   | 0.22     |
| 14   | MC   | 158,023 | 0.59    | 0.10   | 0.41     |
| 22   | MC   | 157,894 | 0.60    | 0.17   | 0.32     |
| 23   | MC   | 158,025 | 0.46    | 0.09   | 0.27     |
| 24   | MC   | 158,029 | 0.67    | 0.09   | 0.42     |
| 25   | MC   | 157,901 | 0.43    | 0.15   | 0.30     |
| 26   | MC   | 157,894 | 0.41    | 0.16   | 0.27     |
| 27   | MC   | 157,942 | 0.48    | 0.12   | 0.21     |
| 28   | MC   | 157,878 | 0.50    | 0.17   | 0.32     |
| 29   | MC   | 157,938 | 0.66    | 0.15   | 0.34     |
| 30   | MC   | 157,904 | 0.55    | 0.15   | 0.32     |
| 31   | MC   | 157,906 | 0.33    | 0.14   | 0.14     |
| 32   | MC   | 157,869 | 0.59    | 0.18   | 0.37     |
| 33   | MC   | 157,796 | 0.46    | 0.23   | 0.23     |
| 34   | MC   | 157,904 | 0.51    | 0.17   | 0.24     |
| 35   | MC   | 157,849 | 0.59    | 0.21   | 0.40     |
| 36   | MC   | 158,142 | 0.38    | 0.03   | 0.13     |
| 37   | MC   | 158,143 | 0.76    | 0.03   | 0.40     |
| 38   | MC   | 158,090 | 0.34    | 0.05   | 0.19     |
| 39   | MC   | 158,125 | 0.53    | 0.04   | 0.38     |
| 40   | MC   | 158,123 | 0.48    | 0.04   | 0.31     |
| 41   | MC   | 158,053 | 0.53    | 0.08   | 0.43     |
| 42   | MC   | 157,980 | 0.56    | 0.13   | 0.31     |
| 43   | CR2  | 157,763 | 0.71    | 0.28   | 0.53     |
| 44   | CR2  | 157,382 | 0.72    | 0.52   | 0.63     |
| 45   | CR4  | 157,309 | 0.56    | 0.57   | 0.69     |
| 46   | CR2  | 157,916 | 0.70    | 0.19   | 0.55     |
| 47   | CR2  | 157,183 | 0.60    | 0.65   | 0.59     |
| 48   | CR2  | 157,775 | 0.78    | 0.27   | 0.57     |
| 49   | CR2  | 157,589 | 0.71    | 0.39   | 0.60     |
| 50   | CR2  | 157,020 | 0.69    | 0.75   | 0.55     |
| 51   | CR4  | 156,802 | 0.58    | 0.89   | 0.71     |

**Table M5. ELA Grade 7 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 148,805 | 0.49    | 0.03   | 0.44     |
| 2    | MC   | 148,752 | 0.68    | 0.05   | 0.16     |
| 3    | MC   | 148,717 | 0.66    | 0.05   | 0.45     |
| 4    | MC   | 148,727 | 0.52    | 0.06   | 0.36     |
| 5    | MC   | 148,686 | 0.53    | 0.10   | 0.27     |
| 6    | MC   | 148,738 | 0.69    | 0.06   | 0.36     |
| 7    | MC   | 148,725 | 0.63    | 0.07   | 0.46     |
| 8    | MC   | 148,754 | 0.56    | 0.05   | 0.38     |
| 9    | MC   | 148,660 | 0.54    | 0.11   | 0.41     |
| 10   | MC   | 148,737 | 0.58    | 0.05   | 0.37     |
| 11   | MC   | 148,689 | 0.75    | 0.09   | 0.40     |
| 12   | MC   | 148,747 | 0.29    | 0.06   | 0.28     |
| 13   | MC   | 148,715 | 0.63    | 0.08   | 0.38     |
| 14   | MC   | 148,751 | 0.57    | 0.05   | 0.31     |
| 15   | MC   | 148,756 | 0.53    | 0.05   | 0.26     |
| 16   | MC   | 148,707 | 0.53    | 0.08   | 0.38     |
| 17   | MC   | 148,709 | 0.51    | 0.08   | 0.32     |
| 18   | MC   | 148,597 | 0.43    | 0.14   | 0.25     |
| 19   | MC   | 148,703 | 0.74    | 0.07   | 0.53     |
| 20   | MC   | 148,636 | 0.55    | 0.12   | 0.32     |
| 21   | MC   | 148,663 | 0.51    | 0.11   | 0.22     |
| 29   | MC   | 148,614 | 0.40    | 0.14   | 0.20     |
| 30   | MC   | 148,625 | 0.44    | 0.12   | 0.30     |
| 31   | MC   | 148,578 | 0.35    | 0.14   | 0.19     |
| 32   | MC   | 148,516 | 0.51    | 0.19   | 0.39     |
| 33   | MC   | 148,505 | 0.38    | 0.20   | 0.32     |
| 34   | MC   | 148,571 | 0.53    | 0.17   | 0.32     |
| 35   | MC   | 148,553 | 0.70    | 0.19   | 0.41     |
| 36   | MC   | 148,793 | 0.66    | 0.03   | 0.38     |
| 37   | MC   | 148,787 | 0.79    | 0.03   | 0.37     |
| 38   | MC   | 148,750 | 0.53    | 0.04   | 0.20     |
| 39   | MC   | 148,744 | 0.55    | 0.05   | 0.36     |
| 40   | MC   | 148,779 | 0.41    | 0.04   | 0.22     |
| 41   | MC   | 148,757 | 0.62    | 0.05   | 0.37     |
| 42   | MC   | 148,607 | 0.58    | 0.16   | 0.37     |
| 43   | CR2  | 147,974 | 0.65    | 0.59   | 0.61     |
| 44   | CR2  | 147,369 | 0.71    | 1.00   | 0.65     |
| 45   | CR4  | 147,424 | 0.54    | 0.96   | 0.69     |
| 46   | CR2  | 148,527 | 0.76    | 0.22   | 0.58     |
| 47   | CR2  | 147,888 | 0.70    | 0.65   | 0.64     |
| 48   | CR2  | 147,737 | 0.64    | 0.75   | 0.61     |
| 49   | CR2  | 147,388 | 0.65    | 0.99   | 0.63     |
| 50   | CR2  | 146,152 | 0.61    | 1.82   | 0.65     |
| 51   | CR4  | 145,945 | 0.49    | 1.96   | 0.72     |

**Table M6. ELA Grade 8 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 143,444 | 0.59    | 0.07   | 0.34     |
| 2    | MC   | 143,480 | 0.58    | 0.04   | 0.25     |
| 3    | MC   | 143,488 | 0.96    | 0.02   | 0.33     |
| 4    | MC   | 143,472 | 0.89    | 0.03   | 0.38     |
| 5    | MC   | 143,468 | 0.63    | 0.04   | 0.37     |
| 6    | MC   | 143,424 | 0.73    | 0.07   | 0.37     |
| 7    | MC   | 143,467 | 0.75    | 0.04   | 0.31     |
| 8    | MC   | 143,453 | 0.86    | 0.05   | 0.46     |
| 9    | MC   | 143,419 | 0.66    | 0.07   | 0.36     |
| 10   | MC   | 143,440 | 0.66    | 0.06   | 0.40     |
| 11   | MC   | 143,383 | 0.55    | 0.10   | 0.09     |
| 12   | MC   | 143,447 | 0.87    | 0.07   | 0.51     |
| 13   | MC   | 143,455 | 0.71    | 0.06   | 0.30     |
| 14   | MC   | 143,423 | 0.42    | 0.08   | 0.28     |
| 22   | MC   | 143,297 | 0.72    | 0.16   | 0.46     |
| 23   | MC   | 143,403 | 0.69    | 0.09   | 0.49     |
| 24   | MC   | 143,379 | 0.55    | 0.10   | 0.22     |
| 25   | MC   | 143,370 | 0.52    | 0.10   | 0.46     |
| 26   | MC   | 143,298 | 0.63    | 0.15   | 0.47     |
| 27   | MC   | 143,338 | 0.73    | 0.12   | 0.48     |
| 28   | MC   | 143,311 | 0.57    | 0.15   | 0.35     |
| 29   | MC   | 143,329 | 0.61    | 0.14   | 0.40     |
| 30   | MC   | 143,362 | 0.75    | 0.11   | 0.37     |
| 31   | MC   | 143,289 | 0.65    | 0.15   | 0.44     |
| 32   | MC   | 143,232 | 0.53    | 0.19   | 0.30     |
| 33   | MC   | 143,240 | 0.67    | 0.19   | 0.48     |
| 34   | MC   | 143,282 | 0.59    | 0.17   | 0.44     |
| 35   | MC   | 143,236 | 0.60    | 0.20   | 0.40     |
| 36   | MC   | 143,475 | 0.54    | 0.04   | 0.44     |
| 37   | MC   | 143,464 | 0.57    | 0.05   | 0.36     |
| 38   | MC   | 143,463 | 0.72    | 0.04   | 0.46     |
| 39   | MC   | 143,458 | 0.72    | 0.05   | 0.45     |
| 40   | MC   | 143,478 | 0.73    | 0.04   | 0.36     |
| 41   | MC   | 143,433 | 0.54    | 0.07   | 0.37     |
| 42   | MC   | 143,396 | 0.85    | 0.10   | 0.42     |
| 43   | CR2  | 142,419 | 0.73    | 0.79   | 0.54     |
| 44   | CR2  | 141,568 | 0.75    | 1.38   | 0.63     |
| 45   | CR4  | 141,894 | 0.59    | 1.16   | 0.71     |
| 46   | CR2  | 143,118 | 0.78    | 0.30   | 0.54     |
| 47   | CR2  | 142,275 | 0.74    | 0.89   | 0.60     |
| 48   | CR2  | 143,211 | 0.86    | 0.24   | 0.62     |
| 49   | CR2  | 142,228 | 0.80    | 0.92   | 0.64     |
| 50   | CR2  | 141,725 | 0.71    | 1.27   | 0.65     |
| 51   | CR4  | 141,513 | 0.65    | 1.42   | 0.72     |

**Table M7. Mathematics Grade 3 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 178,772 | 0.79    | 0.03   | 0.41     |
| 2    | MC   | 178,727 | 0.77    | 0.04   | 0.43     |
| 3    | MC   | 177,536 | 0.31    | 0.21   | 0.24     |
| 4    | MC   | 178,413 | 0.90    | 0.10   | 0.30     |
| 6    | MC   | 178,401 | 0.69    | 0.13   | 0.44     |
| 7    | MC   | 178,581 | 0.83    | 0.10   | 0.37     |
| 8    | MC   | 178,359 | 0.58    | 0.14   | 0.47     |
| 9    | MC   | 178,357 | 0.58    | 0.19   | 0.43     |
| 11   | MC   | 178,631 | 0.89    | 0.09   | 0.23     |
| 12   | MC   | 178,545 | 0.81    | 0.12   | 0.44     |
| 13   | MC   | 178,482 | 0.55    | 0.11   | 0.43     |
| 14   | MC   | 178,318 | 0.62    | 0.22   | 0.42     |
| 16   | MC   | 178,325 | 0.66    | 0.18   | 0.36     |
| 17   | MC   | 178,259 | 0.56    | 0.26   | 0.55     |
| 19   | MC   | 178,487 | 0.65    | 0.17   | 0.57     |
| 20   | MC   | 178,393 | 0.85    | 0.18   | 0.44     |
| 21   | MC   | 178,255 | 0.73    | 0.31   | 0.47     |
| 22   | MC   | 177,439 | 0.49    | 0.68   | 0.47     |
| 23   | MC   | 178,781 | 0.84    | 0.03   | 0.43     |
| 24   | MC   | 178,632 | 0.57    | 0.08   | 0.56     |
| 25   | MC   | 178,397 | 0.53    | 0.17   | 0.58     |
| 26   | MC   | 178,341 | 0.72    | 0.12   | 0.42     |
| 27   | MC   | 178,492 | 0.64    | 0.11   | 0.41     |
| 28   | MC   | 178,549 | 0.74    | 0.11   | 0.42     |
| 30   | MC   | 178,499 | 0.48    | 0.12   | 0.34     |
| 31   | MC   | 178,443 | 0.89    | 0.12   | 0.30     |
| 32   | MC   | 178,566 | 0.67    | 0.11   | 0.52     |
| 33   | MC   | 178,576 | 0.60    | 0.11   | 0.49     |
| 34   | MC   | 178,630 | 0.89    | 0.10   | 0.31     |
| 35   | MC   | 178,637 | 0.80    | 0.09   | 0.45     |
| 37   | MC   | 178,365 | 0.54    | 0.17   | 0.41     |
| 38   | MC   | 178,397 | 0.59    | 0.17   | 0.48     |
| 39   | MC   | 178,394 | 0.41    | 0.19   | 0.41     |
| 40   | MC   | 178,463 | 0.81    | 0.19   | 0.50     |
| 41   | MC   | 178,636 | 0.58    | 0.10   | 0.53     |
| 42   | MC   | 178,474 | 0.59    | 0.17   | 0.47     |
| 43   | MC   | 178,404 | 0.64    | 0.23   | 0.59     |
| 45   | CR2  | 178,271 | 0.43    | 0.33   | 0.61     |
| 46   | CR2  | 178,652 | 0.63    | 0.12   | 0.33     |
| 47   | CR2  | 178,474 | 0.69    | 0.22   | 0.58     |
| 48   | CR2  | 178,262 | 0.24    | 0.34   | 0.56     |
| 49   | CR2  | 178,379 | 0.55    | 0.27   | 0.63     |
| 50   | CR3  | 178,166 | 0.37    | 0.39   | 0.56     |
| 51   | CR3  | 178,156 | 0.53    | 0.40   | 0.58     |
| 52   | CR3  | 177,942 | 0.34    | 0.52   | 0.69     |



**Table M8. Mathematics Grade 4 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 174,275 | 0.83    | 0.02   | 0.43     |
| 2    | MC   | 174,195 | 0.77    | 0.04   | 0.47     |
| 3    | MC   | 174,074 | 0.72    | 0.05   | 0.58     |
| 4    | MC   | 174,051 | 0.49    | 0.10   | 0.58     |
| 5    | MC   | 174,040 | 0.65    | 0.10   | 0.47     |
| 6    | MC   | 174,057 | 0.72    | 0.10   | 0.53     |
| 7    | MC   | 174,120 | 0.65    | 0.07   | 0.33     |
| 8    | MC   | 173,988 | 0.71    | 0.13   | 0.46     |
| 9    | MC   | 174,053 | 0.74    | 0.11   | 0.58     |
| 10   | MC   | 174,039 | 0.58    | 0.10   | 0.64     |
| 12   | MC   | 173,944 | 0.49    | 0.17   | 0.44     |
| 13   | MC   | 174,031 | 0.43    | 0.11   | 0.53     |
| 14   | MC   | 173,993 | 0.41    | 0.11   | 0.36     |
| 16   | MC   | 173,810 | 0.72    | 0.25   | 0.57     |
| 17   | MC   | 174,029 | 0.70    | 0.10   | 0.45     |
| 18   | MC   | 173,954 | 0.61    | 0.18   | 0.52     |
| 19   | MC   | 174,106 | 0.65    | 0.08   | 0.51     |
| 20   | MC   | 174,039 | 0.75    | 0.11   | 0.43     |
| 23   | MC   | 174,204 | 0.75    | 0.05   | 0.28     |
| 24   | MC   | 174,203 | 0.66    | 0.04   | 0.41     |
| 25   | MC   | 174,092 | 0.63    | 0.06   | 0.49     |
| 26   | MC   | 174,090 | 0.61    | 0.08   | 0.51     |
| 27   | MC   | 174,071 | 0.51    | 0.08   | 0.56     |
| 28   | MC   | 174,128 | 0.75    | 0.07   | 0.43     |
| 29   | MC   | 174,108 | 0.79    | 0.09   | 0.47     |
| 30   | MC   | 173,999 | 0.68    | 0.15   | 0.54     |
| 31   | MC   | 174,112 | 0.70    | 0.07   | 0.48     |
| 32   | MC   | 174,020 | 0.69    | 0.12   | 0.55     |
| 33   | MC   | 174,079 | 0.56    | 0.11   | 0.49     |
| 34   | MC   | 174,093 | 0.46    | 0.08   | 0.45     |
| 35   | MC   | 174,122 | 0.55    | 0.07   | 0.42     |
| 37   | MC   | 174,127 | 0.66    | 0.08   | 0.61     |
| 38   | MC   | 174,096 | 0.70    | 0.09   | 0.61     |
| 39   | MC   | 173,913 | 0.60    | 0.18   | 0.51     |
| 40   | MC   | 174,030 | 0.49    | 0.12   | 0.54     |
| 42   | MC   | 174,042 | 0.69    | 0.12   | 0.39     |
| 43   | MC   | 173,944 | 0.67    | 0.16   | 0.53     |
| 45   | MC   | 173,615 | 0.59    | 0.39   | 0.63     |
| 46   | CR2  | 173,886 | 0.47    | 0.25   | 0.60     |
| 47   | CR2  | 173,878 | 0.68    | 0.25   | 0.52     |
| 48   | CR2  | 173,891 | 0.65    | 0.25   | 0.59     |
| 49   | CR2  | 173,788 | 0.40    | 0.31   | 0.63     |
| 50   | CR2  | 173,670 | 0.49    | 0.37   | 0.66     |

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 51   | CR2  | 173,791 | 0.58    | 0.30   | 0.45     |
| 52   | CR3  | 173,706 | 0.23    | 0.35   | 0.63     |
| 53   | CR3  | 173,763 | 0.59    | 0.32   | 0.59     |
| 54   | CR3  | 173,860 | 0.51    | 0.26   | 0.73     |
| 55   | CR3  | 173,787 | 0.50    | 0.31   | 0.70     |

**Table M9. Mathematics Grade 5 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 162,832 | 0.57    | 0.08   | 0.53     |
| 2    | MC   | 162,837 | 0.64    | 0.07   | 0.56     |
| 3    | MC   | 162,835 | 0.86    | 0.07   | 0.46     |
| 4    | MC   | 162,610 | 0.64    | 0.19   | 0.03     |
| 5    | MC   | 162,775 | 0.68    | 0.08   | 0.44     |
| 6    | MC   | 162,752 | 0.47    | 0.11   | 0.41     |
| 8    | MC   | 162,763 | 0.53    | 0.10   | 0.46     |
| 9    | MC   | 162,687 | 0.45    | 0.14   | 0.43     |
| 10   | MC   | 162,735 | 0.61    | 0.09   | 0.51     |
| 11   | MC   | 162,876 | 0.83    | 0.04   | 0.44     |
| 13   | MC   | 162,832 | 0.71    | 0.07   | 0.30     |
| 14   | MC   | 162,756 | 0.64    | 0.10   | 0.48     |
| 15   | MC   | 162,550 | 0.38    | 0.22   | 0.41     |
| 16   | MC   | 162,660 | 0.49    | 0.14   | 0.52     |
| 17   | MC   | 162,788 | 0.62    | 0.08   | 0.58     |
| 18   | MC   | 162,701 | 0.56    | 0.14   | 0.48     |
| 19   | MC   | 162,610 | 0.30    | 0.21   | 0.39     |
| 20   | MC   | 162,654 | 0.31    | 0.17   | 0.47     |
| 23   | MC   | 162,846 | 0.75    | 0.08   | 0.47     |
| 24   | MC   | 162,869 | 0.57    | 0.05   | 0.26     |
| 25   | MC   | 162,880 | 0.74    | 0.05   | 0.35     |
| 26   | MC   | 162,805 | 0.78    | 0.09   | 0.43     |
| 27   | MC   | 162,821 | 0.46    | 0.07   | 0.49     |
| 28   | MC   | 162,770 | 0.62    | 0.10   | 0.42     |
| 29   | MC   | 162,809 | 0.63    | 0.08   | 0.51     |
| 31   | MC   | 162,768 | 0.76    | 0.11   | 0.53     |
| 33   | MC   | 162,821 | 0.50    | 0.07   | 0.50     |
| 34   | MC   | 162,778 | 0.59    | 0.10   | 0.39     |
| 36   | MC   | 162,742 | 0.51    | 0.11   | 0.29     |
| 37   | MC   | 162,830 | 0.47    | 0.07   | 0.43     |
| 39   | MC   | 162,730 | 0.67    | 0.11   | 0.50     |
| 40   | MC   | 162,789 | 0.60    | 0.09   | 0.37     |
| 41   | MC   | 162,781 | 0.72    | 0.10   | 0.49     |
| 42   | MC   | 162,725 | 0.50    | 0.12   | 0.62     |
| 43   | MC   | 162,747 | 0.52    | 0.13   | 0.61     |
| 44   | MC   | 162,784 | 0.37    | 0.11   | 0.51     |

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 45   | MC   | 162,400 | 0.74    | 0.35   | 0.44     |
| 46   | CR2  | 162,894 | 0.59    | 0.06   | 0.62     |
| 47   | CR2  | 162,576 | 0.51    | 0.26   | 0.55     |
| 48   | CR2  | 162,739 | 0.71    | 0.16   | 0.60     |
| 49   | CR2  | 161,483 | 0.45    | 0.93   | 0.60     |
| 50   | CR2  | 162,306 | 0.40    | 0.42   | 0.59     |
| 51   | CR2  | 161,883 | 0.57    | 0.68   | 0.43     |
| 52   | CR3  | 162,228 | 0.51    | 0.47   | 0.69     |
| 53   | CR3  | 162,276 | 0.24    | 0.44   | 0.66     |
| 54   | CR3  | 162,216 | 0.20    | 0.48   | 0.62     |
| 55   | CR3  | 159,463 | 0.20    | 2.17   | 0.48     |

**Table M10. Mathematics Grade 6 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 161,157 | 0.83    | 0.03   | 0.27     |
| 2    | MC   | 161,114 | 0.71    | 0.05   | 0.37     |
| 4    | MC   | 160,880 | 0.68    | 0.18   | 0.42     |
| 5    | MC   | 161,048 | 0.54    | 0.06   | 0.39     |
| 7    | MC   | 161,021 | 0.63    | 0.09   | 0.44     |
| 8    | MC   | 161,059 | 0.70    | 0.07   | 0.27     |
| 9    | MC   | 160,869 | 0.14    | 0.19   | 0.30     |
| 11   | MC   | 161,023 | 0.62    | 0.08   | 0.38     |
| 12   | MC   | 160,856 | 0.54    | 0.10   | 0.49     |
| 13   | MC   | 160,846 | 0.47    | 0.19   | 0.50     |
| 14   | MC   | 161,012 | 0.77    | 0.10   | 0.45     |
| 15   | MC   | 161,067 | 0.35    | 0.07   | 0.56     |
| 16   | MC   | 160,936 | 0.38    | 0.14   | 0.37     |
| 17   | MC   | 160,769 | 0.48    | 0.24   | 0.34     |
| 18   | MC   | 161,021 | 0.64    | 0.09   | 0.48     |
| 19   | MC   | 160,991 | 0.47    | 0.10   | 0.50     |
| 20   | MC   | 160,988 | 0.62    | 0.11   | 0.45     |
| 21   | MC   | 160,994 | 0.54    | 0.11   | 0.52     |
| 22   | MC   | 161,021 | 0.59    | 0.09   | 0.35     |
| 25   | MC   | 160,843 | 0.63    | 0.19   | 0.26     |
| 26   | MC   | 160,495 | 0.29    | 0.42   | 0.32     |
| 27   | MC   | 161,138 | 0.82    | 0.04   | 0.24     |
| 28   | MC   | 161,020 | 0.71    | 0.11   | 0.50     |
| 29   | MC   | 161,039 | 0.72    | 0.08   | 0.48     |
| 30   | MC   | 160,957 | 0.38    | 0.12   | 0.49     |
| 31   | MC   | 161,033 | 0.71    | 0.07   | 0.47     |
| 33   | MC   | 161,005 | 0.46    | 0.11   | 0.51     |
| 34   | MC   | 161,016 | 0.62    | 0.11   | 0.40     |
| 35   | MC   | 161,011 | 0.54    | 0.08   | 0.29     |
| 36   | MC   | 160,990 | 0.78    | 0.09   | 0.47     |

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 37   | MC   | 161,064 | 0.29    | 0.07   | 0.21     |
| 38   | MC   | 161,003 | 0.46    | 0.10   | 0.53     |
| 39   | MC   | 160,991 | 0.41    | 0.10   | 0.43     |
| 40   | MC   | 160,998 | 0.46    | 0.10   | 0.42     |
| 41   | MC   | 161,073 | 0.59    | 0.06   | 0.49     |
| 42   | MC   | 160,943 | 0.68    | 0.12   | 0.43     |
| 43   | MC   | 160,966 | 0.34    | 0.12   | 0.42     |
| 44   | MC   | 160,993 | 0.26    | 0.11   | 0.21     |
| 45   | MC   | 160,947 | 0.40    | 0.12   | 0.36     |
| 46   | MC   | 161,030 | 0.48    | 0.09   | 0.45     |
| 47   | MC   | 160,954 | 0.42    | 0.14   | 0.30     |
| 48   | MC   | 161,069 | 0.85    | 0.07   | 0.38     |
| 49   | MC   | 160,926 | 0.54    | 0.15   | 0.56     |
| 52   | CR2  | 161,022 | 0.55    | 0.12   | 0.62     |
| 53   | CR2  | 160,475 | 0.41    | 0.46   | 0.60     |
| 54   | CR2  | 160,790 | 0.55    | 0.26   | 0.56     |
| 55   | CR2  | 160,693 | 0.35    | 0.32   | 0.66     |
| 56   | CR2  | 160,328 | 0.39    | 0.55   | 0.62     |
| 57   | CR2  | 160,292 | 0.28    | 0.57   | 0.66     |
| 58   | CR3  | 158,952 | 0.20    | 1.40   | 0.54     |
| 59   | CR3  | 160,047 | 0.34    | 0.73   | 0.68     |
| 60   | CR3  | 160,217 | 0.12    | 0.62   | 0.55     |
| 61   | CR3  | 160,462 | 0.41    | 0.47   | 0.70     |

**Table M11. Mathematics Grade 7 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 147,029 | 0.70    | 0.14   | 0.46     |
| 2    | MC   | 146,822 | 0.40    | 0.26   | 0.37     |
| 4    | MC   | 146,749 | 0.44    | 0.31   | 0.37     |
| 6    | MC   | 147,094 | 0.80    | 0.08   | 0.33     |
| 7    | MC   | 146,879 | 0.44    | 0.22   | 0.33     |
| 8    | MC   | 147,078 | 0.54    | 0.08   | 0.43     |
| 9    | MC   | 147,026 | 0.48    | 0.11   | 0.44     |
| 10   | MC   | 146,871 | 0.47    | 0.24   | 0.51     |
| 11   | MC   | 147,060 | 0.69    | 0.10   | 0.49     |
| 12   | MC   | 147,090 | 0.57    | 0.08   | 0.39     |
| 13   | MC   | 147,032 | 0.51    | 0.10   | 0.45     |
| 14   | MC   | 147,010 | 0.33    | 0.13   | 0.47     |
| 15   | MC   | 146,883 | 0.47    | 0.22   | 0.49     |
| 16   | MC   | 147,072 | 0.63    | 0.08   | 0.37     |
| 17   | MC   | 146,935 | 0.57    | 0.17   | 0.37     |
| 18   | MC   | 146,881 | 0.31    | 0.21   | 0.38     |
| 20   | MC   | 146,840 | 0.60    | 0.25   | 0.54     |
| 21   | MC   | 146,829 | 0.44    | 0.26   | 0.42     |

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 22   | MC   | 146,907 | 0.38    | 0.20   | 0.41     |
| 23   | MC   | 146,875 | 0.47    | 0.21   | 0.37     |
| 24   | MC   | 146,762 | 0.34    | 0.29   | 0.34     |
| 25   | MC   | 146,851 | 0.70    | 0.24   | 0.54     |
| 27   | MC   | 147,224 | 0.67    | 0.01   | 0.47     |
| 28   | MC   | 147,091 | 0.51    | 0.10   | 0.50     |
| 29   | MC   | 147,071 | 0.48    | 0.10   | 0.54     |
| 30   | MC   | 146,822 | 0.51    | 0.27   | 0.50     |
| 31   | MC   | 147,072 | 0.51    | 0.10   | 0.53     |
| 33   | MC   | 147,109 | 0.67    | 0.07   | 0.54     |
| 34   | MC   | 146,988 | 0.39    | 0.16   | 0.33     |
| 35   | MC   | 146,992 | 0.48    | 0.14   | 0.54     |
| 36   | MC   | 146,995 | 0.51    | 0.15   | 0.53     |
| 37   | MC   | 147,068 | 0.42    | 0.10   | 0.38     |
| 38   | MC   | 146,889 | 0.45    | 0.22   | 0.42     |
| 39   | MC   | 147,020 | 0.35    | 0.12   | 0.32     |
| 40   | MC   | 147,070 | 0.57    | 0.10   | 0.52     |
| 41   | MC   | 147,052 | 0.39    | 0.11   | 0.43     |
| 42   | MC   | 147,059 | 0.50    | 0.11   | 0.24     |
| 43   | MC   | 146,890 | 0.64    | 0.22   | 0.51     |
| 44   | MC   | 147,049 | 0.48    | 0.11   | 0.31     |
| 45   | MC   | 147,058 | 0.39    | 0.10   | 0.46     |
| 46   | MC   | 146,988 | 0.60    | 0.16   | 0.42     |
| 47   | MC   | 147,071 | 0.54    | 0.10   | 0.56     |
| 48   | MC   | 147,119 | 0.55    | 0.07   | 0.40     |
| 49   | MC   | 147,006 | 0.49    | 0.14   | 0.47     |
| 52   | CR2  | 145,763 | 0.30    | 1.01   | 0.63     |
| 53   | CR2  | 146,648 | 0.44    | 0.41   | 0.75     |
| 54   | CR2  | 146,700 | 0.58    | 0.37   | 0.62     |
| 55   | CR2  | 146,377 | 0.46    | 0.59   | 0.59     |
| 56   | CR2  | 145,143 | 0.28    | 1.43   | 0.68     |
| 57   | CR2  | 144,673 | 0.56    | 1.75   | 0.60     |
| 58   | CR3  | 145,117 | 0.32    | 1.45   | 0.61     |
| 59   | CR3  | 145,491 | 0.31    | 1.20   | 0.60     |
| 60   | CR3  | 145,619 | 0.34    | 1.11   | 0.74     |
| 61   | CR3  | 146,269 | 0.48    | 0.67   | 0.73     |

**Table M12. Mathematics Grade 8 Classical Item Analysis**

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 1    | MC   | 115,097 | 0.83    | 0.07   | 0.34     |
| 2    | MC   | 115,110 | 0.51    | 0.05   | 0.49     |
| 3    | MC   | 115,035 | 0.46    | 0.11   | 0.38     |
| 4    | MC   | 115,093 | 0.61    | 0.05   | 0.40     |
| 5    | MC   | 114,926 | 0.58    | 0.20   | 0.41     |

# Appendix M: Classical Test Theory Statistics

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 6    | MC   | 114,932 | 0.51    | 0.18   | 0.34     |
| 7    | MC   | 114,976 | 0.44    | 0.16   | 0.46     |
| 8    | MC   | 115,070 | 0.49    | 0.07   | 0.34     |
| 9    | MC   | 114,979 | 0.39    | 0.15   | 0.37     |
| 10   | MC   | 115,055 | 0.55    | 0.09   | 0.28     |
| 11   | MC   | 115,030 | 0.57    | 0.11   | 0.43     |
| 12   | MC   | 114,959 | 0.51    | 0.18   | 0.40     |
| 15   | MC   | 115,003 | 0.27    | 0.14   | 0.43     |
| 16   | MC   | 114,978 | 0.36    | 0.15   | 0.29     |
| 17   | MC   | 114,983 | 0.57    | 0.15   | 0.48     |
| 19   | MC   | 115,028 | 0.55    | 0.10   | 0.49     |
| 20   | MC   | 115,026 | 0.72    | 0.11   | 0.46     |
| 21   | MC   | 115,043 | 0.31    | 0.10   | 0.24     |
| 22   | MC   | 115,050 | 0.76    | 0.10   | 0.39     |
| 24   | MC   | 114,920 | 0.64    | 0.20   | 0.29     |
| 25   | MC   | 114,961 | 0.65    | 0.16   | 0.30     |
| 26   | MC   | 114,934 | 0.53    | 0.20   | 0.43     |
| 27   | MC   | 115,087 | 0.66    | 0.08   | 0.35     |
| 28   | MC   | 114,966 | 0.52    | 0.16   | 0.53     |
| 29   | MC   | 115,040 | 0.58    | 0.10   | 0.47     |
| 30   | MC   | 115,041 | 0.53    | 0.09   | 0.42     |
| 32   | MC   | 114,982 | 0.33    | 0.14   | 0.43     |
| 33   | MC   | 114,997 | 0.54    | 0.15   | 0.26     |
| 34   | MC   | 115,007 | 0.50    | 0.12   | 0.49     |
| 35   | MC   | 114,965 | 0.60    | 0.16   | 0.40     |
| 36   | MC   | 114,806 | 0.48    | 0.32   | 0.42     |
| 37   | MC   | 115,053 | 0.67    | 0.09   | 0.39     |
| 38   | MC   | 115,040 | 0.54    | 0.10   | 0.44     |
| 39   | MC   | 115,065 | 0.41    | 0.07   | 0.27     |
| 40   | MC   | 114,870 | 0.48    | 0.26   | 0.42     |
| 41   | MC   | 115,088 | 0.74    | 0.06   | 0.38     |
| 42   | MC   | 115,051 | 0.65    | 0.10   | 0.45     |
| 44   | MC   | 115,039 | 0.47    | 0.09   | 0.39     |
| 45   | MC   | 115,046 | 0.49    | 0.09   | 0.40     |
| 46   | MC   | 115,076 | 0.48    | 0.07   | 0.37     |
| 47   | MC   | 115,061 | 0.42    | 0.09   | 0.32     |
| 48   | MC   | 115,030 | 0.43    | 0.11   | 0.44     |
| 49   | MC   | 114,989 | 0.45    | 0.15   | 0.33     |
| 50   | MC   | 114,993 | 0.33    | 0.14   | 0.30     |
| 52   | CR2  | 113,885 | 0.40    | 1.13   | 0.49     |
| 53   | CR2  | 114,032 | 0.37    | 1.01   | 0.54     |
| 54   | CR2  | 110,790 | 0.38    | 3.82   | 0.58     |
| 55   | CR2  | 112,705 | 0.45    | 2.16   | 0.65     |
| 56   | CR2  | 112,551 | 0.26    | 2.29   | 0.64     |

## Appendix M: Classical Test Theory Statistics

| Item | Type | N-Count | P-Value | % Omit | PBis Key |
|------|------|---------|---------|--------|----------|
| 57   | CR2  | 110,792 | 0.38    | 3.82   | 0.59     |
| 58   | CR3  | 111,958 | 0.27    | 2.81   | 0.64     |
| 59   | CR3  | 111,214 | 0.23    | 3.45   | 0.68     |
| 60   | CR3  | 111,121 | 0.25    | 3.53   | 0.70     |
| 61   | CR3  | 110,384 | 0.19    | 4.17   | 0.67     |

## Appendix N: Items Flagged for DIF

These tables support the DIF information in Section 5, “Operational Test Data Collection and Classical Analysis.” They include item numbers, focal group, and directions of DIF and DIF statistics. Tables N1–N3 show items flagged by the SMD, or Mantel-Haenszel methods. No mathematics constructed-response items were flagged for DIF, so that table has been omitted. Positive values of SMD and Delta in Tables N1–N3 indicate DIF in favor of a focal group, and negative values of SMD and Delta indicate DIF against a focal group. External linking and field test items (i.e., those not contributing to students’ scores) have been omitted.

**Table N1. ELA MC Item Classical DIF Flags**

| Grade | Item | Subgroup   | DIF     | Alpha | MH      | Delta |
|-------|------|------------|---------|-------|---------|-------|
| 3     | 21   | Black      | Against | 1.55  | 827.60  | -1.03 |
| 3     | 21   | Hispanic   | Against | 1.89  | 2332.50 | -1.49 |
| 3     | 21   | Asian      | Against | 1.61  | 624.80  | -1.11 |
| 3     | 21   | High Needs | Against | 1.65  | 1789.70 | -1.18 |
| 3     | 21   | ELL        | Against | 1.70  | 720.40  | -1.24 |
| 3     | 25   | Female     | Against | 1.66  | 1620.60 | -1.19 |
| 3     | 25   | Hispanic   | Against | 1.67  | 1141.40 | -1.20 |
| 3     | 25   | ELL        | Against | 1.77  | 999.10  | -1.34 |
| 4     | 6    | Asian      | Against | 1.67  | 787.00  | -1.21 |
| 4     | 6    | High Needs | Against | 1.63  | 1705.70 | -1.15 |
| 4     | 15   | ELL        | Against | 1.58  | 533.80  | -1.07 |
| 4     | 16   | Hispanic   | Against | 1.56  | 1161.50 | -1.05 |
| 5     | 1    | ELL        | Against | 1.60  | 415.70  | -1.10 |
| 5     | 3    | Black      | Against | 2.06  | 2027.90 | -1.70 |
| 5     | 3    | Hispanic   | Against | 2.11  | 2666.00 | -1.75 |
| 5     | 3    | Asian      | Against | 2.40  | 1683.60 | -2.06 |
| 5     | 3    | High Needs | Against | 2.03  | 2849.70 | -1.66 |
| 5     | 3    | ELL        | Against | 1.95  | 801.60  | -1.57 |
| 5     | 8    | Black      | Against | 1.60  | 653.30  | -1.11 |
| 5     | 8    | Hispanic   | Against | 1.73  | 1078.50 | -1.29 |
| 5     | 8    | Asian      | Against | 1.78  | 522.90  | -1.36 |
| 5     | 8    | High Needs | Against | 1.78  | 1337.40 | -1.36 |
| 5     | 8    | ELL        | Against | 1.87  | 883.40  | -1.47 |
| 5     | 16   | Black      | Against | 1.58  | 883.70  | -1.07 |
| 5     | 16   | Hispanic   | Against | 1.69  | 1471.20 | -1.23 |
| 5     | 16   | ELL        | Against | 1.60  | 447.00  | -1.11 |
| 5     | 18   | Black      | Against | 1.55  | 638.30  | -1.03 |
| 5     | 32   | Black      | Against | 1.65  | 954.00  | -1.18 |
| 5     | 32   | Hispanic   | Against | 1.65  | 1176.70 | -1.18 |
| 5     | 32   | High Needs | Against | 1.58  | 1140.80 | -1.08 |
| 5     | 32   | ELL        | Against | 1.54  | 381.30  | -1.01 |
| 5     | 33   | ELL        | Against | 1.70  | 578.20  | -1.24 |
| 5     | 40   | Asian      | Against | 1.54  | 380.20  | -1.01 |
| 6     | 1    | ELL        | Against | 1.85  | 826.10  | -1.44 |



## Appendix N: Items Flagged for DIF

| Grade | Item | Subgroup   | DIF      | Alpha | MH      | Delta |
|-------|------|------------|----------|-------|---------|-------|
| 6     | 2    | Hispanic   | Against  | 1.65  | 1191.70 | -1.18 |
| 6     | 2    | Asian      | Against  | 1.59  | 449.20  | -1.10 |
| 6     | 2    | High Needs | Against  | 1.56  | 1061.80 | -1.04 |
| 6     | 2    | ELL        | Against  | 1.90  | 936.40  | -1.51 |
| 6     | 31   | Female     | Against  | 1.68  | 2227.70 | -1.22 |
| 6     | 37   | Hispanic   | Against  | 1.69  | 1090.60 | -1.24 |
| 6     | 37   | Asian      | Against  | 1.68  | 431.40  | -1.22 |
| 6     | 37   | High Needs | Against  | 1.56  | 849.60  | -1.04 |
| 6     | 37   | ELL        | Against  | 2.02  | 1132.00 | -1.65 |
| 6     | 41   | Female     | Against  | 1.65  | 1877.10 | -1.17 |
| 7     | 1    | Female     | Against  | 1.56  | 1391.20 | -1.05 |
| 7     | 1    | Black      | Against  | 1.63  | 932.90  | -1.15 |
| 7     | 1    | Hispanic   | Against  | 1.65  | 1180.80 | -1.17 |
| 7     | 1    | High Needs | Against  | 1.65  | 1529.50 | -1.17 |
| 7     | 1    | ELL        | Against  | 1.59  | 280.20  | -1.09 |
| 7     | 3    | Female     | Against  | 1.68  | 1681.50 | -1.22 |
| 7     | 3    | Asian      | Against  | 1.53  | 342.40  | -1.00 |
| 7     | 10   | Female     | Against  | 1.63  | 1743.60 | -1.15 |
| 7     | 10   | Hispanic   | Against  | 1.55  | 959.00  | -1.04 |
| 7     | 10   | Asian      | Against  | 1.73  | 754.70  | -1.29 |
| 7     | 10   | ELL        | Against  | 2.24  | 1056.10 | -1.89 |
| 7     | 12   | Hispanic   | Against  | 1.62  | 952.50  | -1.13 |
| 7     | 12   | High Needs | Against  | 1.59  | 1281.90 | -1.10 |
| 7     | 17   | Asian      | Against  | 1.88  | 1083.40 | -1.48 |
| 7     | 17   | ELL        | Against  | 1.77  | 526.60  | -1.34 |
| 7     | 19   | Hispanic   | Against  | 1.73  | 985.80  | -1.28 |
| 7     | 19   | Asian      | Against  | 1.66  | 313.60  | -1.20 |
| 7     | 19   | High Needs | Against  | 1.56  | 729.30  | -1.05 |
| 7     | 19   | ELL        | Against  | 1.60  | 398.50  | -1.10 |
| 8     | 2    | ELL        | Against  | 1.61  | 415.70  | -1.12 |
| 8     | 3    | Black      | In Favor | 0.60  | 169.10  | 1.21  |
| 8     | 4    | ELL        | Against  | 1.64  | 361.90  | -1.16 |
| 8     | 8    | ELL        | Against  | 1.91  | 697.20  | -1.53 |
| 8     | 10   | Asian      | Against  | 1.96  | 992.20  | -1.58 |
| 8     | 36   | Black      | Against  | 1.98  | 1797.50 | -1.61 |
| 8     | 36   | Hispanic   | Against  | 1.95  | 1988.80 | -1.56 |
| 8     | 36   | Asian      | Against  | 1.56  | 428.30  | -1.04 |
| 8     | 36   | High Needs | Against  | 1.76  | 1703.30 | -1.33 |

**Table N2. ELA CR Item Classical DIF Flags**

| Grade | Item | Subgroup   | DIF      | SMD  | Effect |
|-------|------|------------|----------|------|--------|
| 4     | 33   | High Needs | In Favor | 0.12 | 0.18   |
| 5     | 43   | Black      | In Favor | 0.12 | 0.20   |
| 5     | 43   | Hispanic   | In Favor | 0.12 | 0.20   |
| 5     | 43   | Asian      | In Favor | 0.12 | 0.20   |
| 5     | 43   | High Needs | In Favor | 0.12 | 0.20   |
| 5     | 45   | Asian      | In Favor | 0.21 | 0.20   |
| 6     | 45   | Female     | In Favor | 0.18 | 0.18   |
| 7     | 48   | High Needs | In Favor | 0.13 | 0.18   |
| 7     | 49   | High Needs | In Favor | 0.14 | 0.19   |
| 7     | 51   | Female     | In Favor | 0.22 | 0.18   |
| 8     | 45   | Female     | In Favor | 0.21 | 0.19   |
| 8     | 46   | Black      | In Favor | 0.10 | 0.17   |
| 8     | 46   | Hispanic   | In Favor | 0.10 | 0.18   |
| 8     | 46   | High Needs | In Favor | 0.12 | 0.21   |

**Table N3. Mathematics MC Item Classical DIF Flags**

| Grade | Item | Subgroup   | DIF      | Alpha | MH      | Delta |
|-------|------|------------|----------|-------|---------|-------|
| 3     | 24   | Asian      | In Favor | 0.52  | 803.70  | 1.55  |
| 3     | 33   | Black      | Against  | 1.62  | 955.10  | -1.14 |
| 4     | 4    | Female     | Against  | 1.66  | 1781.70 | -1.20 |
| 4     | 6    | Black      | Against  | 1.55  | 616.20  | -1.04 |
| 4     | 6    | Asian      | Against  | 1.61  | 346.80  | -1.12 |
| 4     | 29   | Asian      | Against  | 1.54  | 227.40  | -1.02 |
| 4     | 43   | Black      | In Favor | 0.62  | 743.10  | 1.13  |
| 4     | 43   | Asian      | In Favor | 0.65  | 294.90  | 1.02  |
| 5     | 5    | ELL        | Against  | 1.62  | 605.20  | -1.13 |
| 5     | 10   | ELL        | Against  | 1.54  | 429.30  | -1.02 |
| 5     | 26   | Asian      | In Favor | 0.65  | 195.50  | 1.01  |
| 6     | 5    | High Needs | In Favor | 0.64  | 1171.70 | 1.04  |
| 6     | 15   | Black      | Against  | 1.55  | 522.00  | -1.02 |
| 7     | 9    | Black      | Against  | 1.56  | 715.00  | -1.04 |
| 7     | 12   | Hispanic   | Against  | 1.66  | 1214.40 | -1.19 |
| 7     | 12   | Asian      | Against  | 1.80  | 777.20  | -1.38 |
| 7     | 12   | High Needs | Against  | 1.78  | 1844.60 | -1.36 |
| 7     | 12   | ELL        | Against  | 1.74  | 672.30  | -1.31 |
| 7     | 13   | High Needs | Against  | 1.54  | 1031.00 | -1.01 |
| 8     | 29   | Female     | Against  | 1.57  | 1052.40 | -1.05 |

**Table N4. Mathematics CR Item Classical DIF Flags**

| <b>Grade</b> | <b>Item</b> | <b>Subgroup</b> | <b>DIF</b> | <b>SMD</b> | <b>Effect</b> |
|--------------|-------------|-----------------|------------|------------|---------------|
| 5            | 55          | ELL             | In Favor   | 0.14       | 0.17          |
| 6            | 54          | Female          | In Favor   | 0.14       | 0.18          |
| 6            | 56          | Black           | Against    | -0.13      | -0.18         |
| 8            | 58          | Black           | Against    | -0.23      | -0.20         |
| 8            | 58          | Hispanic        | Against    | -0.22      | -0.19         |

## Appendix O: IRT Statistics

External linking and field test items (i.e., those not contributing to students' scores) have been omitted.

**Table O1. ELA Grade 3 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 388.95     | 8  | 95.24      | 462.41     | Y       |
| 2    | 3PL   | 379.36     | 8  | 92.84      | 461.97     | Y       |
| 3    | 3PL   | 353.25     | 8  | 86.31      | 461.95     | Y       |
| 4    | 3PL   | 757.27     | 8  | 187.32     | 461.79     | Y       |
| 5    | 3PL   | 317.82     | 8  | 77.45      | 461.83     | Y       |
| 6    | 3PL   | 345.19     | 8  | 84.30      | 461.65     | Y       |
| 13   | 3PL   | 720.58     | 8  | 178.15     | 461.57     | Y       |
| 14   | 3PL   | 255.26     | 8  | 61.82      | 461.32     | Y       |
| 15   | 3PL   | 382.35     | 8  | 93.59      | 461.45     | Y       |
| 16   | 3PL   | 423.22     | 8  | 103.80     | 460.88     | Y       |
| 17   | 3PL   | 240.68     | 8  | 58.17      | 461.73     | Y       |
| 18   | 3PL   | 153.22     | 8  | 36.31      | 461.60     | Y       |
| 19   | 3PL   | 251.29     | 8  | 60.82      | 461.39     | Y       |
| 20   | 3PL   | 624.37     | 8  | 154.09     | 461.52     | Y       |
| 21   | 3PL   | 681.02     | 8  | 168.26     | 461.49     | Y       |
| 22   | 3PL   | 737.73     | 8  | 182.43     | 461.25     | Y       |
| 23   | 3PL   | 243.48     | 8  | 58.87      | 461.11     | Y       |
| 24   | 3PL   | 399.43     | 8  | 97.86      | 460.67     | Y       |
| 25   | 3PL   | 414.45     | 8  | 101.61     | 462.46     | Y       |
| 26   | 3PL   | 245.63     | 8  | 59.41      | 462.18     | Y       |
| 27   | 3PL   | 1492.10    | 8  | 371.03     | 461.89     | Y       |
| 28   | 3PL   | 344.44     | 8  | 84.11      | 462.11     | Y       |
| 29   | 3PL   | 347.46     | 8  | 84.86      | 462.29     | Y       |
| 30   | 3PL   | 325.40     | 8  | 79.35      | 462.01     | Y       |
| 31   | 3PL   | 581.90     | 8  | 143.48     | 461.73     | Y       |
| 32   | 2PPC  | 586.47     | 17 | 97.66      | 460.39     | Y       |
| 33   | 2PPC  | 469.91     | 17 | 77.67      | 458.62     | Y       |
| 34   | 2PPC  | 613.98     | 35 | 69.20      | 458.19     | Y       |
| 35   | 2PPC  | 430.10     | 17 | 70.85      | 461.98     | Y       |
| 36   | 2PPC  | 749.24     | 17 | 125.58     | 460.58     | Y       |
| 37   | 2PPC  | 834.61     | 17 | 140.22     | 459.33     | Y       |
| 38   | 2PPC  | 1385.40    | 17 | 234.67     | 457.72     | Y       |
| 39   | 2PPC  | 1101.80    | 17 | 186.03     | 456.97     | Y       |
| 40   | 2PPC  | 324.55     | 35 | 34.61      | 455.25     | Y       |

**Table O2. ELA Grade 4 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 349.81     | 8  | 85.45      | 456.00     | Y       |
| 2    | 3PL   | 346.60     | 8  | 84.65      | 455.95     | Y       |
| 3    | 3PL   | 193.35     | 8  | 46.34      | 455.59     | Y       |
| 4    | 3PL   | 399.37     | 8  | 97.84      | 455.60     | Y       |
| 5    | 3PL   | 353.58     | 8  | 86.40      | 455.65     | Y       |
| 6    | 3PL   | 170.65     | 8  | 40.66      | 455.64     | Y       |
| 13   | 3PL   | 324.25     | 8  | 79.06      | 455.63     | Y       |
| 14   | 3PL   | 418.17     | 8  | 102.54     | 455.51     | Y       |
| 15   | 3PL   | 343.74     | 8  | 83.93      | 455.44     | Y       |
| 16   | 3PL   | 393.09     | 8  | 96.27      | 455.46     | Y       |
| 17   | 3PL   | 597.78     | 8  | 147.44     | 455.62     | Y       |
| 18   | 3PL   | 397.64     | 8  | 97.41      | 455.54     | Y       |
| 19   | 3PL   | 188.16     | 8  | 45.04      | 455.10     | Y       |
| 20   | 3PL   | 356.33     | 8  | 87.08      | 455.38     | Y       |
| 21   | 3PL   | 343.03     | 8  | 83.76      | 455.47     | Y       |
| 22   | 3PL   | 224.29     | 8  | 54.07      | 455.31     | Y       |
| 23   | 3PL   | 167.57     | 8  | 39.89      | 455.13     | Y       |
| 24   | 3PL   | 321.56     | 8  | 78.39      | 454.98     | Y       |
| 25   | 3PL   | 298.11     | 8  | 72.53      | 455.96     | Y       |
| 26   | 3PL   | 238.50     | 8  | 57.62      | 455.82     | Y       |
| 27   | 3PL   | 388.20     | 8  | 95.05      | 455.57     | Y       |
| 28   | 3PL   | 586.61     | 8  | 144.65     | 455.72     | Y       |
| 29   | 3PL   | 792.27     | 8  | 196.07     | 455.85     | Y       |
| 30   | 3PL   | 279.26     | 8  | 67.82      | 455.71     | Y       |
| 31   | 3PL   | 314.12     | 8  | 76.53      | 455.39     | Y       |
| 32   | 2PPC  | 641.36     | 17 | 107.08     | 453.02     | Y       |
| 33   | 2PPC  | 737.22     | 17 | 123.52     | 452.70     | Y       |
| 34   | 2PPC  | 653.24     | 35 | 73.89      | 450.60     | Y       |
| 35   | 2PPC  | 699.45     | 17 | 117.04     | 455.45     | Y       |
| 36   | 2PPC  | 778.61     | 17 | 130.61     | 453.66     | Y       |
| 37   | 2PPC  | 637.94     | 17 | 106.49     | 454.53     | Y       |
| 38   | 2PPC  | 980.11     | 17 | 165.17     | 453.73     | Y       |
| 39   | 2PPC  | 566.52     | 17 | 94.24      | 453.09     | Y       |
| 40   | 2PPC  | 1043.40    | 35 | 120.52     | 452.61     | Y       |

**Table O3. ELA Grade 5 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 227.08     | 8  | 54.77      | 428.74     | Y       |
| 2    | 3PL   | 236.39     | 8  | 57.10      | 428.09     | Y       |
| 3    | 3PL   | 441.66     | 8  | 108.42     | 428.48     | Y       |
| 4    | 3PL   | 160.71     | 8  | 38.18      | 428.55     | Y       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 5    | 3PL   | 203.69     | 8  | 48.92      | 428.55     | Y       |
| 6    | 3PL   | 221.22     | 8  | 53.31      | 428.46     | Y       |
| 7    | 3PL   | 164.36     | 8  | 39.09      | 428.50     | Y       |
| 8    | 3PL   | 233.71     | 8  | 56.43      | 428.49     | Y       |
| 9    | 3PL   | 188.11     | 8  | 45.03      | 428.25     | Y       |
| 10   | 3PL   | 352.11     | 8  | 86.03      | 428.29     | Y       |
| 11   | 3PL   | 178.36     | 8  | 42.59      | 428.34     | Y       |
| 12   | 3PL   | 414.33     | 8  | 101.58     | 428.46     | Y       |
| 13   | 3PL   | 247.61     | 8  | 59.90      | 428.45     | Y       |
| 14   | 3PL   | 749.88     | 8  | 185.47     | 428.47     | Y       |
| 15   | 3PL   | 136.35     | 8  | 32.09      | 428.33     | Y       |
| 16   | 3PL   | 391.94     | 8  | 95.98      | 428.41     | Y       |
| 17   | 3PL   | 332.77     | 8  | 81.19      | 428.20     | Y       |
| 18   | 3PL   | 228.17     | 8  | 55.04      | 428.26     | Y       |
| 19   | 3PL   | 393.46     | 8  | 96.37      | 428.25     | Y       |
| 20   | 3PL   | 203.04     | 8  | 48.76      | 428.16     | Y       |
| 21   | 3PL   | 236.68     | 8  | 57.17      | 428.22     | Y       |
| 29   | 3PL   | 447.97     | 8  | 109.99     | 428.15     | Y       |
| 30   | 3PL   | 103.86     | 8  | 23.96      | 428.17     | Y       |
| 31   | 3PL   | 245.66     | 8  | 59.41      | 427.93     | Y       |
| 32   | 3PL   | 481.93     | 8  | 118.48     | 428.02     | Y       |
| 33   | 3PL   | 338.73     | 8  | 82.68      | 427.91     | Y       |
| 34   | 3PL   | 314.01     | 8  | 76.50      | 428.10     | Y       |
| 35   | 3PL   | 260.76     | 8  | 63.19      | 427.67     | Y       |
| 36   | 3PL   | 408.71     | 8  | 100.18     | 428.65     | Y       |
| 37   | 3PL   | 1692.60    | 8  | 421.14     | 428.56     | Y       |
| 38   | 3PL   | 265.44     | 8  | 64.36      | 428.27     | Y       |
| 39   | 3PL   | 660.86     | 8  | 163.21     | 428.54     | Y       |
| 40   | 3PL   | 358.73     | 8  | 87.68      | 428.38     | Y       |
| 41   | 3PL   | 283.52     | 8  | 68.88      | 428.52     | Y       |
| 42   | 3PL   | 1044.70    | 8  | 259.18     | 428.44     | Y       |
| 43   | 2PPC  | 247.25     | 17 | 39.49      | 427.90     | Y       |
| 44   | 2PPC  | 1549.10    | 17 | 262.75     | 426.51     | Y       |
| 45   | 2PPC  | 492.84     | 35 | 54.72      | 426.38     | Y       |
| 46   | 2PPC  | 246.32     | 17 | 39.33      | 428.35     | Y       |
| 47   | 2PPC  | 364.42     | 17 | 59.58      | 427.26     | Y       |
| 48   | 2PPC  | 406.78     | 17 | 66.85      | 427.46     | Y       |
| 49   | 2PPC  | 400.93     | 17 | 65.84      | 426.57     | Y       |
| 50   | 2PPC  | 1045.10    | 17 | 176.31     | 426.13     | Y       |
| 51   | 2PPC  | 523.93     | 35 | 58.44      | 425.21     | Y       |

**Table O4. ELA Grade 6 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 301.94     | 8  | 73.48      | 421.62     | Y       |
| 2    | 3PL   | 365.33     | 8  | 89.33      | 421.58     | Y       |
| 3    | 3PL   | 308.86     | 8  | 75.22      | 421.49     | Y       |
| 4    | 3PL   | 207.70     | 8  | 49.92      | 421.34     | Y       |
| 5    | 3PL   | 179.69     | 8  | 42.92      | 421.39     | Y       |
| 6    | 3PL   | 271.06     | 8  | 65.77      | 421.51     | Y       |
| 7    | 3PL   | 257.44     | 8  | 62.36      | 421.15     | Y       |
| 8    | 3PL   | 197.67     | 8  | 47.42      | 421.37     | Y       |
| 9    | 3PL   | 129.12     | 8  | 30.28      | 421.07     | Y       |
| 10   | 3PL   | 303.25     | 8  | 73.81      | 421.39     | Y       |
| 11   | 3PL   | 1199.80    | 8  | 297.95     | 421.16     | Y       |
| 12   | 3PL   | 305.04     | 8  | 74.26      | 421.39     | Y       |
| 13   | 3PL   | 446.20     | 8  | 109.55     | 421.35     | Y       |
| 14   | 3PL   | 303.01     | 8  | 73.75      | 421.26     | Y       |
| 22   | 3PL   | 181.47     | 8  | 43.37      | 420.92     | Y       |
| 23   | 3PL   | 218.96     | 8  | 52.74      | 421.27     | Y       |
| 24   | 3PL   | 275.28     | 8  | 66.82      | 421.28     | Y       |
| 25   | 3PL   | 619.42     | 8  | 152.85     | 420.94     | Y       |
| 26   | 3PL   | 339.11     | 8  | 82.78      | 420.92     | Y       |
| 27   | 3PL   | 324.97     | 8  | 79.24      | 421.05     | Y       |
| 28   | 3PL   | 251.32     | 8  | 60.83      | 420.88     | Y       |
| 29   | 3PL   | 176.26     | 8  | 42.06      | 421.04     | Y       |
| 30   | 3PL   | 394.90     | 8  | 96.72      | 420.95     | Y       |
| 31   | 3PL   | 50.59      | 8  | 10.65      | 420.95     | Y       |
| 32   | 3PL   | 246.78     | 8  | 59.69      | 420.85     | Y       |
| 33   | 3PL   | 204.84     | 8  | 49.21      | 420.66     | Y       |
| 34   | 3PL   | 124.87     | 8  | 29.22      | 420.95     | Y       |
| 35   | 3PL   | 257.92     | 8  | 62.48      | 420.80     | Y       |
| 36   | 3PL   | 233.82     | 8  | 56.46      | 421.58     | Y       |
| 37   | 3PL   | 245.02     | 8  | 59.25      | 421.58     | Y       |
| 38   | 3PL   | 171.61     | 8  | 40.90      | 421.44     | Y       |
| 39   | 3PL   | 312.62     | 8  | 76.15      | 421.54     | Y       |
| 40   | 3PL   | 338.40     | 8  | 82.60      | 421.53     | Y       |
| 41   | 3PL   | 357.83     | 8  | 87.46      | 421.34     | Y       |
| 42   | 3PL   | 274.76     | 8  | 66.69      | 421.15     | Y       |
| 43   | 2PPC  | 416.19     | 17 | 68.46      | 420.57     | Y       |
| 44   | 2PPC  | 632.56     | 17 | 105.57     | 419.55     | Y       |
| 45   | 2PPC  | 654.86     | 35 | 74.09      | 419.36     | Y       |
| 46   | 2PPC  | 373.44     | 17 | 61.13      | 420.98     | Y       |
| 47   | 2PPC  | 446.41     | 17 | 73.64      | 419.02     | Y       |
| 48   | 2PPC  | 317.72     | 17 | 51.57      | 420.60     | Y       |
| 49   | 2PPC  | 517.21     | 17 | 85.79      | 420.11     | Y       |
| 50   | 2PPC  | 1307.50    | 17 | 221.31     | 418.59     | Y       |
| 51   | 2PPC  | 800.87     | 35 | 91.54      | 418.01     | Y       |

**Table O5. ELA Grade 7 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 250.76     | 8  | 60.69      | 396.81     | Y       |
| 2    | 3PL   | 512.92     | 8  | 126.23     | 396.67     | Y       |
| 3    | 3PL   | 240.66     | 8  | 58.17      | 396.58     | Y       |
| 4    | 3PL   | 156.09     | 8  | 37.02      | 396.61     | Y       |
| 5    | 3PL   | 104.75     | 8  | 24.19      | 396.50     | Y       |
| 6    | 3PL   | 224.91     | 8  | 54.23      | 396.63     | Y       |
| 7    | 3PL   | 214.12     | 8  | 51.53      | 396.60     | Y       |
| 8    | 3PL   | 207.43     | 8  | 49.86      | 396.68     | Y       |
| 9    | 3PL   | 257.55     | 8  | 62.39      | 396.43     | Y       |
| 10   | 3PL   | 166.44     | 8  | 39.61      | 396.63     | Y       |
| 11   | 3PL   | 143.88     | 8  | 33.97      | 396.50     | Y       |
| 12   | 3PL   | 668.36     | 8  | 165.09     | 396.66     | Y       |
| 13   | 3PL   | 156.22     | 8  | 37.06      | 396.57     | Y       |
| 14   | 3PL   | 114.29     | 8  | 26.57      | 396.67     | Y       |
| 15   | 3PL   | 350.14     | 8  | 85.54      | 396.68     | Y       |
| 16   | 3PL   | 211.34     | 8  | 50.83      | 396.55     | Y       |
| 17   | 3PL   | 156.44     | 8  | 37.11      | 396.56     | Y       |
| 18   | 3PL   | 179.32     | 8  | 42.83      | 396.26     | Y       |
| 19   | 3PL   | 272.30     | 8  | 66.07      | 396.54     | Y       |
| 20   | 3PL   | 947.32     | 8  | 234.83     | 396.36     | Y       |
| 21   | 3PL   | 132.81     | 8  | 31.20      | 396.43     | Y       |
| 29   | 3PL   | 119.60     | 8  | 27.90      | 396.30     | Y       |
| 30   | 3PL   | 151.73     | 8  | 35.93      | 396.33     | Y       |
| 31   | 3PL   | 229.29     | 8  | 55.32      | 396.21     | Y       |
| 32   | 3PL   | 359.12     | 8  | 87.78      | 396.04     | Y       |
| 33   | 3PL   | 515.63     | 8  | 126.91     | 396.01     | Y       |
| 34   | 3PL   | 175.09     | 8  | 41.77      | 396.19     | Y       |
| 35   | 3PL   | 358.38     | 8  | 87.60      | 396.14     | Y       |
| 36   | 3PL   | 196.23     | 8  | 47.06      | 396.78     | Y       |
| 37   | 3PL   | 202.44     | 8  | 48.61      | 396.77     | Y       |
| 38   | 3PL   | 86.28      | 8  | 19.57      | 396.67     | Y       |
| 39   | 3PL   | 161.21     | 8  | 38.30      | 396.65     | Y       |
| 40   | 3PL   | 156.72     | 8  | 37.18      | 396.74     | Y       |
| 41   | 3PL   | 185.94     | 8  | 44.49      | 396.69     | Y       |
| 42   | 3PL   | 232.91     | 8  | 56.23      | 396.29     | Y       |
| 43   | 2PPC  | 891.90     | 17 | 150.04     | 394.60     | Y       |
| 44   | 2PPC  | 542.53     | 17 | 90.13      | 392.98     | Y       |
| 45   | 2PPC  | 611.24     | 35 | 68.87      | 393.13     | Y       |
| 46   | 2PPC  | 288.95     | 17 | 46.64      | 396.07     | Y       |
| 47   | 2PPC  | 581.55     | 17 | 96.82      | 394.37     | Y       |
| 48   | 2PPC  | 557.00     | 17 | 92.61      | 393.97     | Y       |
| 49   | 2PPC  | 786.40     | 17 | 131.95     | 393.03     | Y       |
| 50   | 2PPC  | 283.03     | 17 | 45.62      | 389.74     | Y       |
| 51   | 2PPC  | 810.93     | 35 | 92.74      | 389.19     | Y       |



**Table O6. ELA Grade 8 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 458.16     | 8  | 112.54     | 382.52     | Y       |
| 2    | 3PL   | 124.52     | 8  | 29.13      | 382.61     | Y       |
| 3    | 3PL   | 156.00     | 8  | 37.00      | 382.63     | Y       |
| 4    | 3PL   | 271.25     | 8  | 65.81      | 382.59     | Y       |
| 5    | 3PL   | 286.97     | 8  | 69.74      | 382.58     | Y       |
| 6    | 3PL   | 154.48     | 8  | 36.62      | 382.46     | Y       |
| 7    | 3PL   | 335.79     | 8  | 81.95      | 382.58     | Y       |
| 8    | 3PL   | 147.40     | 8  | 34.85      | 382.54     | Y       |
| 9    | 3PL   | 201.84     | 8  | 48.46      | 382.45     | Y       |
| 10   | 3PL   | 210.10     | 8  | 50.52      | 382.51     | Y       |
| 11   | 3PL   | 1172.00    | 8  | 290.99     | 382.35     | Y       |
| 12   | 3PL   | 162.67     | 8  | 38.67      | 382.53     | Y       |
| 13   | 3PL   | 295.91     | 8  | 71.98      | 382.55     | Y       |
| 14   | 3PL   | 422.45     | 8  | 103.61     | 382.46     | Y       |
| 22   | 3PL   | 213.61     | 8  | 51.40      | 382.13     | Y       |
| 23   | 3PL   | 200.69     | 8  | 48.17      | 382.41     | Y       |
| 24   | 3PL   | 125.65     | 8  | 29.41      | 382.34     | Y       |
| 25   | 3PL   | 618.49     | 8  | 152.62     | 382.32     | Y       |
| 26   | 3PL   | 497.05     | 8  | 122.26     | 382.13     | Y       |
| 27   | 3PL   | 217.21     | 8  | 52.30      | 382.23     | Y       |
| 28   | 3PL   | 1212.70    | 8  | 301.18     | 382.16     | Y       |
| 29   | 3PL   | 311.53     | 8  | 75.88      | 382.21     | Y       |
| 30   | 3PL   | 601.95     | 8  | 148.49     | 382.30     | Y       |
| 31   | 3PL   | 460.82     | 8  | 113.21     | 382.10     | Y       |
| 32   | 3PL   | 172.34     | 8  | 41.08      | 381.95     | Y       |
| 33   | 3PL   | 256.50     | 8  | 62.13      | 381.97     | Y       |
| 34   | 3PL   | 349.74     | 8  | 85.43      | 382.09     | Y       |
| 35   | 3PL   | 666.98     | 8  | 164.74     | 381.96     | Y       |
| 36   | 3PL   | 520.55     | 8  | 128.14     | 382.60     | Y       |
| 37   | 3PL   | 253.02     | 8  | 61.26      | 382.57     | Y       |
| 38   | 3PL   | 166.95     | 8  | 39.74      | 382.57     | Y       |
| 39   | 3PL   | 166.13     | 8  | 39.53      | 382.55     | Y       |
| 40   | 3PL   | 199.47     | 8  | 47.87      | 382.61     | Y       |
| 41   | 3PL   | 299.47     | 8  | 72.87      | 382.49     | Y       |
| 42   | 3PL   | 118.22     | 8  | 27.56      | 382.39     | Y       |
| 43   | 2PPC  | 366.44     | 17 | 59.93      | 379.78     | Y       |
| 44   | 2PPC  | 599.67     | 17 | 99.93      | 377.51     | Y       |
| 45   | 2PPC  | 738.02     | 35 | 84.03      | 378.38     | Y       |
| 46   | 2PPC  | 299.67     | 17 | 48.48      | 381.65     | Y       |
| 47   | 2PPC  | 575.24     | 17 | 95.74      | 379.40     | Y       |
| 48   | 2PPC  | 115.81     | 17 | 16.95      | 381.90     | Y       |
| 49   | 2PPC  | 748.76     | 17 | 125.50     | 379.27     | Y       |
| 50   | 2PPC  | 316.48     | 17 | 51.36      | 377.93     | Y       |
| 51   | 2PPC  | 891.14     | 35 | 102.33     | 377.37     | Y       |

**Table O7. Mathematics Grade 3 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 303.61     | 8  | 73.90      | 476.73     | Y       |
| 2    | 3PL   | 268.51     | 8  | 65.13      | 476.61     | Y       |
| 3    | 3PL   | 893.51     | 8  | 221.38     | 473.43     | Y       |
| 4    | 3PL   | 369.87     | 8  | 90.47      | 475.77     | Y       |
| 6    | 3PL   | 250.90     | 8  | 60.73      | 475.74     | Y       |
| 7    | 3PL   | 209.34     | 8  | 50.33      | 476.22     | Y       |
| 8    | 3PL   | 273.17     | 8  | 66.29      | 475.62     | Y       |
| 9    | 3PL   | 205.74     | 8  | 49.44      | 475.62     | Y       |
| 11   | 3PL   | 307.03     | 8  | 74.76      | 476.35     | Y       |
| 12   | 3PL   | 463.98     | 8  | 114.00     | 476.12     | Y       |
| 13   | 3PL   | 216.34     | 8  | 52.09      | 475.95     | Y       |
| 14   | 3PL   | 272.26     | 8  | 66.07      | 475.51     | Y       |
| 16   | 3PL   | 172.75     | 8  | 41.19      | 475.53     | Y       |
| 17   | 3PL   | 451.93     | 8  | 110.98     | 475.36     | Y       |
| 19   | 3PL   | 424.76     | 8  | 104.19     | 475.97     | Y       |
| 20   | 3PL   | 279.46     | 8  | 67.87      | 475.71     | Y       |
| 21   | 3PL   | 282.93     | 8  | 68.73      | 475.35     | Y       |
| 22   | 3PL   | 418.08     | 8  | 102.52     | 473.17     | Y       |
| 23   | 3PL   | 541.44     | 8  | 133.36     | 476.75     | Y       |
| 24   | 3PL   | 386.86     | 8  | 94.72      | 476.35     | Y       |
| 25   | 3PL   | 463.31     | 8  | 113.83     | 475.73     | Y       |
| 26   | 3PL   | 222.93     | 8  | 53.73      | 475.58     | Y       |
| 27   | 3PL   | 310.19     | 8  | 75.55      | 475.98     | Y       |
| 28   | 3PL   | 264.47     | 8  | 64.12      | 476.13     | Y       |
| 30   | 3PL   | 449.57     | 8  | 110.39     | 476.00     | Y       |
| 31   | 3PL   | 496.80     | 8  | 122.20     | 475.85     | Y       |
| 32   | 3PL   | 321.08     | 8  | 78.27      | 476.18     | Y       |
| 33   | 3PL   | 296.78     | 8  | 72.19      | 476.20     | Y       |
| 34   | 3PL   | 458.79     | 8  | 112.70     | 476.35     | Y       |
| 35   | 3PL   | 1086.50    | 8  | 269.62     | 476.37     | Y       |
| 37   | 3PL   | 419.52     | 8  | 102.88     | 475.64     | Y       |
| 38   | 3PL   | 367.11     | 8  | 89.78      | 475.73     | Y       |
| 39   | 3PL   | 338.27     | 8  | 82.57      | 475.72     | Y       |
| 40   | 3PL   | 718.47     | 8  | 177.62     | 475.90     | Y       |
| 41   | 3PL   | 328.49     | 8  | 80.12      | 476.36     | Y       |
| 42   | 3PL   | 265.40     | 8  | 64.35      | 475.93     | Y       |
| 43   | 3PL   | 569.80     | 8  | 140.45     | 475.74     | Y       |
| 45   | 2PPC  | 528.54     | 17 | 87.73      | 475.39     | Y       |
| 46   | 2PPC  | 4028.90    | 17 | 688.03     | 476.41     | N       |
| 47   | 2PPC  | 95.94      | 17 | 13.54      | 475.93     | Y       |
| 48   | 2PPC  | 375.59     | 17 | 61.50      | 475.37     | Y       |
| 49   | 2PPC  | 2004.30    | 17 | 340.82     | 475.68     | Y       |
| 50   | 2PPC  | 139.24     | 26 | 15.70      | 475.11     | Y       |
| 51   | 2PPC  | 1469.00    | 26 | 200.10     | 475.08     | Y       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 52   | 2PPC  | 358.62     | 26 | 46.13      | 474.51     | Y       |

**Table O8. Mathematics Grade 4 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 506.74     | 8  | 124.68     | 464.73     | Y       |
| 2    | 3PL   | 128.53     | 8  | 30.13      | 464.52     | Y       |
| 3    | 3PL   | 321.94     | 8  | 78.49      | 464.20     | Y       |
| 4    | 3PL   | 666.65     | 8  | 164.66     | 464.14     | Y       |
| 5    | 3PL   | 151.33     | 8  | 35.83      | 464.11     | Y       |
| 6    | 3PL   | 924.75     | 8  | 229.19     | 464.15     | Y       |
| 7    | 3PL   | 248.16     | 8  | 60.04      | 464.32     | Y       |
| 8    | 3PL   | 252.83     | 8  | 61.21      | 463.97     | Y       |
| 9    | 3PL   | 320.71     | 8  | 78.18      | 464.14     | Y       |
| 10   | 3PL   | 251.39     | 8  | 60.85      | 464.10     | Y       |
| 12   | 3PL   | 277.40     | 8  | 67.35      | 463.85     | Y       |
| 13   | 3PL   | 476.52     | 8  | 117.13     | 464.08     | Y       |
| 14   | 3PL   | 166.70     | 8  | 39.67      | 463.98     | Y       |
| 16   | 3PL   | 216.84     | 8  | 52.21      | 463.49     | Y       |
| 17   | 3PL   | 215.15     | 8  | 51.79      | 464.08     | Y       |
| 18   | 3PL   | 414.45     | 8  | 101.61     | 463.88     | Y       |
| 19   | 3PL   | 191.32     | 8  | 45.83      | 464.28     | Y       |
| 20   | 3PL   | 236.51     | 8  | 57.13      | 464.10     | Y       |
| 23   | 3PL   | 2375.50    | 8  | 591.88     | 464.54     | N       |
| 24   | 3PL   | 252.99     | 8  | 61.25      | 464.54     | Y       |
| 25   | 3PL   | 196.71     | 8  | 47.18      | 464.25     | Y       |
| 26   | 3PL   | 244.78     | 8  | 59.19      | 464.24     | Y       |
| 27   | 3PL   | 270.45     | 8  | 65.61      | 464.19     | Y       |
| 28   | 3PL   | 138.99     | 8  | 32.75      | 464.34     | Y       |
| 29   | 3PL   | 175.84     | 8  | 41.96      | 464.29     | Y       |
| 30   | 3PL   | 246.55     | 8  | 59.64      | 464.00     | Y       |
| 31   | 3PL   | 400.25     | 8  | 98.06      | 464.30     | Y       |
| 32   | 3PL   | 423.09     | 8  | 103.77     | 464.05     | Y       |
| 33   | 3PL   | 209.60     | 8  | 50.40      | 464.21     | Y       |
| 34   | 3PL   | 435.32     | 8  | 106.83     | 464.25     | Y       |
| 35   | 3PL   | 198.74     | 8  | 47.69      | 464.33     | Y       |
| 37   | 3PL   | 394.93     | 8  | 96.73      | 464.34     | Y       |
| 38   | 3PL   | 296.27     | 8  | 72.07      | 464.26     | Y       |
| 39   | 3PL   | 439.00     | 8  | 107.75     | 463.77     | Y       |
| 40   | 3PL   | 351.41     | 8  | 85.85      | 464.08     | Y       |
| 42   | 3PL   | 140.91     | 8  | 33.23      | 464.11     | Y       |
| 43   | 3PL   | 357.99     | 8  | 87.50      | 463.85     | Y       |
| 45   | 3PL   | 281.27     | 8  | 68.32      | 462.97     | Y       |
| 46   | 2PPC  | 2927.60    | 17 | 499.16     | 463.70     | N       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 47   | 2PPC  | 212.74     | 17 | 33.57      | 463.67     | Y       |
| 48   | 2PPC  | 2738.70    | 17 | 466.76     | 463.71     | N       |
| 49   | 2PPC  | 533.90     | 17 | 88.65      | 463.43     | Y       |
| 50   | 2PPC  | 1441.40    | 17 | 244.29     | 463.12     | Y       |
| 51   | 2PPC  | 854.80     | 17 | 143.68     | 463.44     | Y       |
| 52   | 2PPC  | 173.38     | 26 | 20.44      | 463.22     | Y       |
| 53   | 2PPC  | 379.89     | 26 | 49.08      | 463.37     | Y       |
| 54   | 2PPC  | 375.34     | 26 | 48.45      | 463.63     | Y       |
| 55   | 2PPC  | 240.42     | 26 | 29.73      | 463.43     | Y       |

**Table O9. Mathematics Grade 5 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 586.68     | 8  | 144.67     | 433.69     | Y       |
| 2    | 3PL   | 234.80     | 8  | 56.70      | 433.71     | Y       |
| 3    | 3PL   | 1412.70    | 8  | 351.18     | 433.70     | Y       |
| 4    | 3PL   | 1292.30    | 8  | 321.07     | 433.10     | Y       |
| 5    | 3PL   | 152.67     | 8  | 36.17      | 433.54     | Y       |
| 6    | 3PL   | 384.68     | 8  | 94.17      | 433.48     | Y       |
| 8    | 3PL   | 129.49     | 8  | 30.37      | 433.51     | Y       |
| 9    | 3PL   | 371.83     | 8  | 90.96      | 433.31     | Y       |
| 10   | 3PL   | 187.29     | 8  | 44.82      | 433.43     | Y       |
| 11   | 3PL   | 224.43     | 8  | 54.11      | 433.81     | Y       |
| 13   | 3PL   | 1277.10    | 8  | 317.27     | 433.69     | Y       |
| 14   | 3PL   | 152.22     | 8  | 36.06      | 433.49     | Y       |
| 15   | 3PL   | 422.35     | 8  | 103.59     | 432.94     | Y       |
| 16   | 3PL   | 755.05     | 8  | 186.76     | 433.23     | Y       |
| 17   | 3PL   | 251.92     | 8  | 60.98      | 433.58     | Y       |
| 18   | 3PL   | 158.53     | 8  | 37.63      | 433.35     | Y       |
| 19   | 3PL   | 777.05     | 8  | 192.26     | 433.10     | Y       |
| 20   | 3PL   | 541.44     | 8  | 133.36     | 433.22     | Y       |
| 23   | 3PL   | 538.78     | 8  | 132.69     | 433.73     | Y       |
| 24   | 3PL   | 124.01     | 8  | 29.00      | 433.79     | Y       |
| 25   | 3PL   | 165.52     | 8  | 39.38      | 433.82     | Y       |
| 26   | 3PL   | 1622.40    | 8  | 403.60     | 433.62     | Y       |
| 27   | 3PL   | 173.63     | 8  | 41.41      | 433.66     | Y       |
| 28   | 3PL   | 168.79     | 8  | 40.20      | 433.53     | Y       |
| 29   | 3PL   | 150.96     | 8  | 35.74      | 433.63     | Y       |
| 31   | 3PL   | 460.49     | 8  | 113.12     | 433.52     | Y       |
| 33   | 3PL   | 201.50     | 8  | 48.37      | 433.66     | Y       |
| 34   | 3PL   | 202.97     | 8  | 48.74      | 433.55     | Y       |
| 36   | 3PL   | 98.08      | 8  | 22.52      | 433.45     | Y       |
| 37   | 3PL   | 446.87     | 8  | 109.72     | 433.69     | Y       |
| 39   | 3PL   | 186.00     | 8  | 44.50      | 433.42     | Y       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 40   | 3PL   | 194.04     | 8  | 46.51      | 433.58     | Y       |
| 41   | 3PL   | 484.29     | 8  | 119.07     | 433.56     | Y       |
| 42   | 3PL   | 1034.10    | 8  | 256.53     | 433.41     | Y       |
| 43   | 3PL   | 517.23     | 8  | 127.31     | 433.47     | Y       |
| 44   | 3PL   | 679.06     | 8  | 167.76     | 433.57     | Y       |
| 45   | 3PL   | 284.58     | 8  | 69.15      | 432.54     | Y       |
| 46   | 2PPC  | 946.06     | 17 | 159.33     | 433.86     | Y       |
| 47   | 2PPC  | 1988.50    | 17 | 338.12     | 433.01     | Y       |
| 48   | 2PPC  | 604.59     | 17 | 100.77     | 433.45     | Y       |
| 49   | 2PPC  | 992.21     | 17 | 167.25     | 430.10     | Y       |
| 50   | 2PPC  | 866.78     | 17 | 145.74     | 432.29     | Y       |
| 51   | 2PPC  | 358.81     | 17 | 58.62      | 431.16     | Y       |
| 52   | 2PPC  | 1556.50    | 26 | 212.25     | 432.08     | Y       |
| 53   | 2PPC  | 302.91     | 26 | 38.40      | 432.21     | Y       |
| 54   | 2PPC  | 210.07     | 26 | 25.53      | 432.05     | Y       |
| 55   | 2PPC  | 593.98     | 26 | 78.76      | 424.71     | Y       |

**Table O10. Mathematics Grade 6 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 307.00     | 8  | 74.75      | 428.78     | Y       |
| 2    | 3PL   | 437.88     | 8  | 107.47     | 428.66     | Y       |
| 4    | 3PL   | 1038.20    | 8  | 257.55     | 428.04     | Y       |
| 5    | 3PL   | 160.67     | 8  | 38.17      | 428.49     | Y       |
| 7    | 3PL   | 196.20     | 8  | 47.05      | 428.42     | Y       |
| 8    | 3PL   | 98.31      | 8  | 22.58      | 428.52     | Y       |
| 9    | 3PL   | 1066.60    | 8  | 264.66     | 428.01     | Y       |
| 11   | 3PL   | 172.04     | 8  | 41.01      | 428.42     | Y       |
| 12   | 3PL   | 235.81     | 8  | 56.95      | 427.98     | Y       |
| 13   | 3PL   | 230.58     | 8  | 55.65      | 427.95     | Y       |
| 14   | 3PL   | 682.48     | 8  | 168.62     | 428.39     | Y       |
| 15   | 3PL   | 572.52     | 8  | 141.13     | 428.54     | Y       |
| 16   | 3PL   | 160.49     | 8  | 38.12      | 428.19     | Y       |
| 17   | 3PL   | 279.89     | 8  | 67.97      | 427.74     | Y       |
| 18   | 3PL   | 332.02     | 8  | 81.01      | 428.42     | Y       |
| 19   | 3PL   | 394.84     | 8  | 96.71      | 428.34     | Y       |
| 20   | 3PL   | 248.16     | 8  | 60.04      | 428.33     | Y       |
| 21   | 3PL   | 188.49     | 8  | 45.12      | 428.34     | Y       |
| 22   | 3PL   | 321.81     | 8  | 78.45      | 428.42     | Y       |
| 25   | 3PL   | 215.52     | 8  | 51.88      | 427.94     | Y       |
| 26   | 3PL   | 740.14     | 8  | 183.03     | 427.01     | Y       |
| 27   | 3PL   | 181.52     | 8  | 43.38      | 428.73     | Y       |
| 28   | 3PL   | 325.99     | 8  | 79.50      | 428.41     | Y       |
| 29   | 3PL   | 397.32     | 8  | 97.33      | 428.46     | Y       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 30   | 3PL   | 206.81     | 8  | 49.70      | 428.25     | Y       |
| 31   | 3PL   | 211.87     | 8  | 50.97      | 428.45     | Y       |
| 33   | 3PL   | 177.36     | 8  | 42.34      | 428.37     | Y       |
| 34   | 3PL   | 239.04     | 8  | 57.76      | 428.40     | Y       |
| 35   | 3PL   | 582.97     | 8  | 143.74     | 428.39     | Y       |
| 36   | 3PL   | 509.71     | 8  | 125.43     | 428.33     | Y       |
| 37   | 3PL   | 57.85      | 8  | 12.46      | 428.53     | Y       |
| 38   | 3PL   | 148.47     | 8  | 35.12      | 428.37     | Y       |
| 39   | 3PL   | 634.36     | 8  | 156.59     | 428.34     | Y       |
| 40   | 3PL   | 177.79     | 8  | 42.45      | 428.35     | Y       |
| 41   | 3PL   | 175.28     | 8  | 41.82      | 428.55     | Y       |
| 42   | 3PL   | 724.70     | 8  | 179.18     | 428.21     | Y       |
| 43   | 3PL   | 335.08     | 8  | 81.77      | 428.27     | Y       |
| 44   | 3PL   | 125.58     | 8  | 29.40      | 428.34     | Y       |
| 45   | 3PL   | 244.67     | 8  | 59.17      | 428.22     | Y       |
| 46   | 3PL   | 178.88     | 8  | 42.72      | 428.44     | Y       |
| 47   | 3PL   | 216.86     | 8  | 52.22      | 428.24     | Y       |
| 48   | 3PL   | 1369.60    | 8  | 340.39     | 428.54     | Y       |
| 49   | 3PL   | 321.78     | 8  | 78.45      | 428.16     | Y       |
| 52   | 2PPC  | 2278.00    | 17 | 387.77     | 428.42     | Y       |
| 53   | 2PPC  | 55.02      | 17 | 6.52       | 426.96     | Y       |
| 54   | 2PPC  | 521.02     | 17 | 86.44      | 427.80     | Y       |
| 55   | 2PPC  | 80.61      | 17 | 10.91      | 427.54     | Y       |
| 56   | 2PPC  | 444.72     | 17 | 73.35      | 426.57     | Y       |
| 57   | 2PPC  | 467.13     | 17 | 77.20      | 426.47     | Y       |
| 58   | 2PPC  | 55.92      | 26 | 4.15       | 422.90     | Y       |
| 59   | 2PPC  | 301.12     | 26 | 38.15      | 425.82     | Y       |
| 60   | 2PPC  | 80.19      | 26 | 7.51       | 426.27     | Y       |
| 61   | 2PPC  | 159.71     | 26 | 18.54      | 426.93     | Y       |

**Table O11. Mathematics Grade 7 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 259.06     | 8  | 62.77      | 391.06     | Y       |
| 2    | 3PL   | 149.69     | 8  | 35.42      | 390.51     | Y       |
| 4    | 3PL   | 208.94     | 8  | 50.24      | 390.32     | Y       |
| 6    | 3PL   | 2010.20    | 8  | 500.55     | 391.23     | N       |
| 7    | 3PL   | 122.78     | 8  | 28.70      | 390.66     | Y       |
| 8    | 3PL   | 87.49      | 8  | 19.87      | 391.19     | Y       |
| 9    | 3PL   | 80.77      | 8  | 18.19      | 391.05     | Y       |
| 10   | 3PL   | 87.96      | 8  | 19.99      | 390.64     | Y       |
| 11   | 3PL   | 169.06     | 8  | 40.27      | 391.14     | Y       |
| 12   | 3PL   | 129.30     | 8  | 30.33      | 391.22     | Y       |
| 13   | 3PL   | 170.45     | 8  | 40.61      | 391.07     | Y       |

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 14   | 3PL   | 221.38     | 8  | 53.35      | 391.01     | Y       |
| 15   | 3PL   | 248.71     | 8  | 60.18      | 390.67     | Y       |
| 16   | 3PL   | 614.98     | 8  | 151.74     | 391.17     | Y       |
| 17   | 3PL   | 416.81     | 8  | 102.20     | 390.81     | Y       |
| 18   | 3PL   | 468.69     | 8  | 115.17     | 390.66     | Y       |
| 20   | 3PL   | 141.55     | 8  | 33.39      | 390.55     | Y       |
| 21   | 3PL   | 118.09     | 8  | 27.52      | 390.53     | Y       |
| 22   | 3PL   | 135.50     | 8  | 31.88      | 390.73     | Y       |
| 23   | 3PL   | 319.88     | 8  | 77.97      | 390.65     | Y       |
| 24   | 3PL   | 269.43     | 8  | 65.36      | 390.35     | Y       |
| 25   | 3PL   | 503.25     | 8  | 123.81     | 390.58     | Y       |
| 27   | 3PL   | 640.40     | 8  | 158.10     | 391.58     | Y       |
| 28   | 3PL   | 124.51     | 8  | 29.13      | 391.22     | Y       |
| 29   | 3PL   | 142.94     | 8  | 33.74      | 391.17     | Y       |
| 30   | 3PL   | 100.96     | 8  | 23.24      | 390.51     | Y       |
| 31   | 3PL   | 178.05     | 8  | 42.51      | 391.17     | Y       |
| 33   | 3PL   | 249.15     | 8  | 60.29      | 391.27     | Y       |
| 34   | 3PL   | 292.44     | 8  | 71.11      | 390.95     | Y       |
| 35   | 3PL   | 146.58     | 8  | 34.64      | 390.96     | Y       |
| 36   | 3PL   | 111.89     | 8  | 25.97      | 390.97     | Y       |
| 37   | 3PL   | 155.90     | 8  | 36.97      | 391.16     | Y       |
| 38   | 3PL   | 102.44     | 8  | 23.61      | 390.69     | Y       |
| 39   | 3PL   | 120.69     | 8  | 28.17      | 391.04     | Y       |
| 40   | 3PL   | 375.62     | 8  | 91.91      | 391.17     | Y       |
| 41   | 3PL   | 84.38      | 8  | 19.10      | 391.12     | Y       |
| 42   | 3PL   | 114.98     | 8  | 26.75      | 391.14     | Y       |
| 43   | 3PL   | 140.90     | 8  | 33.22      | 390.69     | Y       |
| 44   | 3PL   | 207.37     | 8  | 49.84      | 391.11     | Y       |
| 45   | 3PL   | 509.66     | 8  | 125.42     | 391.14     | Y       |
| 46   | 3PL   | 935.81     | 8  | 231.95     | 390.95     | Y       |
| 47   | 3PL   | 428.14     | 8  | 105.04     | 391.17     | Y       |
| 48   | 3PL   | 76.37      | 8  | 17.09      | 391.30     | Y       |
| 49   | 3PL   | 98.89      | 8  | 22.72      | 391.00     | Y       |
| 52   | 2PPC  | 211.22     | 17 | 33.31      | 387.69     | Y       |
| 53   | 2PPC  | 157.82     | 17 | 24.15      | 390.04     | Y       |
| 54   | 2PPC  | 343.84     | 17 | 56.05      | 390.18     | Y       |
| 55   | 2PPC  | 885.78     | 17 | 148.99     | 389.33     | Y       |
| 56   | 2PPC  | 408.19     | 17 | 67.09      | 386.03     | Y       |
| 57   | 2PPC  | 278.32     | 17 | 44.82      | 384.78     | Y       |
| 58   | 2PPC  | 791.74     | 26 | 106.19     | 385.96     | Y       |
| 59   | 2PPC  | 94.40      | 26 | 9.49       | 386.96     | Y       |
| 60   | 2PPC  | 318.05     | 26 | 40.50      | 387.30     | Y       |
| 61   | 2PPC  | 132.71     | 26 | 14.80      | 389.03     | Y       |

**Table O12. Mathematics Grade 8 Item Fit Statistics**

| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 1    | 3PL   | 846.02     | 8  | 209.50     | 306.29     | Y       |
| 2    | 3PL   | 176.35     | 8  | 42.09      | 306.33     | Y       |
| 3    | 3PL   | 117.28     | 8  | 27.32      | 306.13     | Y       |
| 4    | 3PL   | 413.44     | 8  | 101.36     | 306.28     | Y       |
| 5    | 3PL   | 90.68      | 8  | 20.67      | 305.84     | Y       |
| 6    | 3PL   | 112.17     | 8  | 26.04      | 305.85     | Y       |
| 7    | 3PL   | 168.83     | 8  | 40.21      | 305.97     | Y       |
| 8    | 3PL   | 256.10     | 8  | 62.02      | 306.22     | Y       |
| 9    | 3PL   | 82.82      | 8  | 18.70      | 305.98     | Y       |
| 10   | 3PL   | 205.67     | 8  | 49.42      | 306.18     | Y       |
| 11   | 3PL   | 186.62     | 8  | 44.65      | 306.11     | Y       |
| 12   | 3PL   | 146.52     | 8  | 34.63      | 305.93     | Y       |
| 15   | 3PL   | 251.49     | 8  | 60.87      | 306.04     | Y       |
| 16   | 3PL   | 124.88     | 8  | 29.22      | 305.98     | Y       |
| 17   | 3PL   | 222.34     | 8  | 53.58      | 305.99     | Y       |
| 19   | 3PL   | 444.22     | 8  | 109.06     | 306.11     | Y       |
| 20   | 3PL   | 766.14     | 8  | 189.53     | 306.10     | Y       |
| 21   | 3PL   | 79.63      | 8  | 17.91      | 306.15     | Y       |
| 22   | 3PL   | 394.96     | 8  | 96.74      | 306.17     | Y       |
| 24   | 3PL   | 1596.70    | 8  | 397.18     | 305.82     | N       |
| 25   | 3PL   | 90.91      | 8  | 20.73      | 305.93     | Y       |
| 26   | 3PL   | 187.97     | 8  | 44.99      | 305.86     | Y       |
| 27   | 3PL   | 326.28     | 8  | 79.57      | 306.27     | Y       |
| 28   | 3PL   | 365.56     | 8  | 89.39      | 305.94     | Y       |
| 29   | 3PL   | 491.96     | 8  | 120.99     | 306.14     | Y       |
| 30   | 3PL   | 252.44     | 8  | 61.11      | 306.14     | Y       |
| 32   | 3PL   | 211.52     | 8  | 50.88      | 305.99     | Y       |
| 33   | 3PL   | 294.86     | 8  | 71.71      | 306.03     | Y       |
| 34   | 3PL   | 124.57     | 8  | 29.14      | 306.05     | Y       |
| 35   | 3PL   | 166.68     | 8  | 39.67      | 305.94     | Y       |
| 36   | 3PL   | 159.22     | 8  | 37.80      | 305.52     | Y       |
| 37   | 3PL   | 268.65     | 8  | 65.16      | 306.18     | Y       |
| 38   | 3PL   | 116.21     | 8  | 27.05      | 306.14     | Y       |
| 39   | 3PL   | 150.37     | 8  | 35.59      | 306.21     | Y       |
| 40   | 3PL   | 180.61     | 8  | 43.15      | 305.69     | Y       |
| 41   | 3PL   | 490.43     | 8  | 120.61     | 306.27     | Y       |
| 42   | 3PL   | 388.05     | 8  | 95.01      | 306.17     | Y       |
| 44   | 3PL   | 98.72      | 8  | 22.68      | 306.14     | Y       |
| 45   | 3PL   | 192.30     | 8  | 46.07      | 306.16     | Y       |
| 46   | 3PL   | 92.57      | 8  | 21.14      | 306.24     | Y       |
| 47   | 3PL   | 57.56      | 8  | 12.39      | 306.20     | Y       |
| 48   | 3PL   | 80.29      | 8  | 18.07      | 306.11     | Y       |



| Item | Model | Chi Square | DF | Z-observed | Z-critical | Fit OK? |
|------|-------|------------|----|------------|------------|---------|
| 49   | 3PL   | 75.11      | 8  | 16.78      | 306.01     | Y       |
| 50   | 3PL   | 75.68      | 8  | 16.92      | 306.02     | Y       |
| 52   | 2PPC  | 530.22     | 17 | 88.02      | 303.06     | Y       |
| 53   | 2PPC  | 97.91      | 17 | 13.88      | 303.45     | Y       |
| 54   | 2PPC  | 53.56      | 17 | 6.27       | 294.81     | Y       |
| 55   | 2PPC  | 101.00     | 17 | 14.41      | 299.91     | Y       |
| 56   | 2PPC  | 72.44      | 17 | 9.51       | 299.51     | Y       |
| 57   | 2PPC  | 58.72      | 17 | 7.16       | 294.82     | Y       |
| 58   | 2PPC  | 93.32      | 26 | 9.34       | 297.93     | Y       |
| 59   | 2PPC  | 44.28      | 26 | 2.53       | 295.94     | Y       |
| 60   | 2PPC  | 113.97     | 26 | 12.20      | 295.70     | Y       |
| 61   | 2PPC  | 88.64      | 26 | 8.69       | 293.73     | Y       |

**Table O13. ELA Grade 3 OP Item Parameter Estimates**

| Item | Max Pts | a-par / alpha | b-par / step1 | c-par / step2 | step3 | step4 |
|------|---------|---------------|---------------|---------------|-------|-------|
| 1    | 1       | 1.039         | -0.270        | 0.294         |       |       |
| 2    | 1       | 1.095         | -1.413        | 0.148         |       |       |
| 3    | 1       | 0.886         | 0.384         | 0.180         |       |       |
| 4    | 1       | 0.979         | -1.619        | 0.005         |       |       |
| 5    | 1       | 0.639         | -1.086        | 0.010         |       |       |
| 6    | 1       | 0.790         | 0.519         | 0.134         |       |       |
| 13   | 1       | 0.641         | -0.369        | 0.041         |       |       |
| 14   | 1       | 0.713         | 0.158         | 0.191         |       |       |
| 15   | 1       | 1.004         | 1.167         | 0.243         |       |       |
| 16   | 1       | 0.638         | 0.769         | 0.189         |       |       |
| 17   | 1       | 0.796         | 0.706         | 0.230         |       |       |
| 18   | 1       | 0.596         | 0.814         | 0.229         |       |       |
| 19   | 1       | 0.690         | -0.417        | 0.183         |       |       |
| 20   | 1       | 1.194         | 0.803         | 0.194         |       |       |
| 21   | 1       | 0.828         | 0.522         | 0.145         |       |       |
| 22   | 1       | 1.000         | 1.032         | 0.191         |       |       |
| 23   | 1       | 0.727         | 1.031         | 0.254         |       |       |
| 24   | 1       | 1.027         | 0.005         | 0.226         |       |       |
| 25   | 1       | 0.943         | -0.377        | 0.169         |       |       |
| 26   | 1       | 0.743         | -0.047        | 0.184         |       |       |
| 27   | 1       | 1.275         | 1.220         | 0.143         |       |       |
| 28   | 1       | 0.970         | -0.691        | 0.177         |       |       |
| 29   | 1       | 0.507         | -0.369        | 0.087         |       |       |
| 30   | 1       | 0.924         | 0.408         | 0.192         |       |       |
| 31   | 1       | 1.111         | 0.909         | 0.213         |       |       |
| 32   | 2       | 1.394         | -2.012        | 1.194         |       |       |
| 33   | 2       | 1.362         | -0.853        | 1.847         |       |       |
| 34   | 4       | 1.383         | -1.624        | 0.388         | 2.278 | 4.122 |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 35   | 2       | 1.678            | -1.441           | 1.885            |       |       |
| 36   | 2       | 1.463            | -1.647           | 1.825            |       |       |
| 37   | 2       | 1.416            | -1.123           | 1.965            |       |       |
| 38   | 2       | 1.431            | -0.942           | 2.265            |       |       |
| 39   | 2       | 1.686            | -0.402           | 2.507            |       |       |
| 40   | 4       | 1.348            | -0.544           | 1.160            | 2.626 | 4.019 |

**Table O14. ELA Grade 4 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 1    | 1       | 0.845            | 0.510            | 0.213            |       |       |
| 2    | 1       | 0.711            | 0.524            | 0.105            |       |       |
| 3    | 1       | 0.443            | -0.661           | 0.039            |       |       |
| 4    | 1       | 0.325            | -0.076           | 0.004            |       |       |
| 5    | 1       | 0.758            | -0.197           | 0.125            |       |       |
| 6    | 1       | 0.313            | -0.787           | 0.034            |       |       |
| 13   | 1       | 0.527            | 1.001            | 0.095            |       |       |
| 14   | 1       | 0.893            | 0.985            | 0.208            |       |       |
| 15   | 1       | 0.823            | 0.275            | 0.159            |       |       |
| 16   | 1       | 0.925            | 0.470            | 0.214            |       |       |
| 17   | 1       | 0.645            | -0.229           | 0.055            |       |       |
| 18   | 1       | 0.771            | 0.399            | 0.149            |       |       |
| 19   | 1       | 0.608            | 1.207            | 0.235            |       |       |
| 20   | 1       | 0.389            | -0.031           | 0.007            |       |       |
| 21   | 1       | 0.683            | -0.181           | 0.130            |       |       |
| 22   | 1       | 0.728            | 1.346            | 0.244            |       |       |
| 23   | 1       | 0.402            | -0.393           | 0.127            |       |       |
| 24   | 1       | 0.719            | 1.053            | 0.182            |       |       |
| 25   | 1       | 0.651            | -0.541           | 0.097            |       |       |
| 26   | 1       | 0.522            | 1.236            | 0.109            |       |       |
| 27   | 1       | 1.001            | 1.444            | 0.305            |       |       |
| 28   | 1       | 0.674            | 1.211            | 0.150            |       |       |
| 29   | 1       | 0.383            | 0.041            | 0.007            |       |       |
| 30   | 1       | 0.612            | -0.270           | 0.144            |       |       |
| 31   | 1       | 0.825            | -0.132           | 0.260            |       |       |
| 32   | 2       | 1.535            | -1.570           | 1.442            |       |       |
| 33   | 2       | 1.424            | -1.679           | 1.282            |       |       |
| 34   | 4       | 1.449            | -1.644           | 0.084            | 1.574 | 3.048 |
| 35   | 2       | 1.424            | -2.391           | 1.364            |       |       |
| 36   | 2       | 1.764            | -1.614           | 1.262            |       |       |
| 37   | 2       | 1.579            | -2.570           | -0.150           |       |       |
| 38   | 2       | 1.800            | -2.231           | 0.963            |       |       |
| 39   | 2       | 1.854            | -2.247           | 1.410            |       |       |
| 40   | 4       | 1.774            | -1.999           | -0.104           | 1.701 | 3.242 |

**Table O15. ELA Grade 5 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 1    | 1       | 0.587            | -2.174           | 0.168            |       |       |
| 2    | 1       | 0.670            | -0.236           | 0.181            |       |       |
| 3    | 1       | 1.020            | -0.013           | 0.180            |       |       |
| 4    | 1       | 0.430            | -1.070           | 0.128            |       |       |
| 5    | 1       | 0.415            | 0.559            | 0.170            |       |       |
| 6    | 1       | 0.621            | 1.348            | 0.274            |       |       |
| 7    | 1       | 0.584            | -2.205           | 0.016            |       |       |
| 8    | 1       | 0.640            | -1.456           | 0.059            |       |       |
| 9    | 1       | 0.500            | -1.451           | 0.049            |       |       |
| 10   | 1       | 0.551            | -0.585           | 0.079            |       |       |
| 11   | 1       | 0.569            | 1.629            | 0.269            |       |       |
| 12   | 1       | 0.831            | 0.629            | 0.213            |       |       |
| 13   | 1       | 0.972            | -1.231           | 0.191            |       |       |
| 14   | 1       | 0.677            | -1.051           | 0.050            |       |       |
| 15   | 1       | 0.410            | 0.929            | 0.261            |       |       |
| 16   | 1       | 0.545            | -0.328           | 0.081            |       |       |
| 17   | 1       | 0.862            | -0.073           | 0.212            |       |       |
| 18   | 1       | 0.737            | -0.945           | 0.158            |       |       |
| 19   | 1       | 0.834            | 0.449            | 0.191            |       |       |
| 20   | 1       | 0.458            | -0.973           | 0.086            |       |       |
| 21   | 1       | 0.631            | 0.423            | 0.195            |       |       |
| 29   | 1       | 0.934            | 1.779            | 0.282            |       |       |
| 30   | 1       | 0.199            | -0.067           | 0.023            |       |       |
| 31   | 1       | 0.675            | 0.754            | 0.240            |       |       |
| 32   | 1       | 1.164            | -0.128           | 0.264            |       |       |
| 33   | 1       | 0.831            | -0.033           | 0.214            |       |       |
| 34   | 1       | 0.784            | 0.339            | 0.257            |       |       |
| 35   | 1       | 0.647            | 1.123            | 0.218            |       |       |
| 36   | 1       | 0.552            | 1.343            | 0.153            |       |       |
| 37   | 1       | 0.214            | -2.759           | 0.005            |       |       |
| 38   | 1       | 0.657            | 0.027            | 0.164            |       |       |
| 39   | 1       | 0.447            | -1.778           | 0.003            |       |       |
| 40   | 1       | 0.911            | -0.324           | 0.205            |       |       |
| 41   | 1       | 0.631            | -1.578           | 0.023            |       |       |
| 42   | 1       | 0.548            | -2.069           | 0.003            |       |       |
| 43   | 2       | 1.187            | -3.478           | -0.371           |       |       |
| 44   | 2       | 1.235            | -2.217           | 0.245            |       |       |
| 45   | 4       | 1.109            | -2.480           | -0.786           | 0.995 | 2.437 |
| 46   | 2       | 1.455            | -3.856           | -0.652           |       |       |
| 47   | 2       | 1.170            | -2.565           | -0.086           |       |       |
| 48   | 2       | 1.312            | -2.232           | 0.345            |       |       |
| 49   | 2       | 1.184            | -1.733           | 0.598            |       |       |
| 50   | 2       | 1.490            | -2.057           | -0.126           |       |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 51   | 4       | 1.216            | -1.679           | -0.335           | 1.157 | 2.699 |

**Table O16. ELA Grade 6 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 1    | 1       | 0.419            | -0.971           | 0.005            |       |       |
| 2    | 1       | 0.750            | -0.252           | 0.301            |       |       |
| 3    | 1       | 1.035            | -0.170           | 0.263            |       |       |
| 4    | 1       | 0.472            | -0.208           | 0.139            |       |       |
| 5    | 1       | 0.406            | -1.059           | 0.028            |       |       |
| 6    | 1       | 0.948            | -0.604           | 0.203            |       |       |
| 7    | 1       | 0.755            | 1.640            | 0.208            |       |       |
| 8    | 1       | 0.563            | 2.005            | 0.212            |       |       |
| 9    | 1       | 0.480            | 0.635            | 0.226            |       |       |
| 10   | 1       | 0.538            | -0.570           | 0.078            |       |       |
| 11   | 1       | 0.208            | 0.118            | 0.004            |       |       |
| 12   | 1       | 0.664            | -0.915           | 0.062            |       |       |
| 13   | 1       | 0.797            | 1.520            | 0.200            |       |       |
| 14   | 1       | 0.708            | -0.073           | 0.133            |       |       |
| 22   | 1       | 0.592            | 0.075            | 0.228            |       |       |
| 23   | 1       | 0.662            | 0.967            | 0.230            |       |       |
| 24   | 1       | 0.842            | -0.220           | 0.239            |       |       |
| 25   | 1       | 1.181            | 0.994            | 0.260            |       |       |
| 26   | 1       | 0.786            | 1.144            | 0.224            |       |       |
| 27   | 1       | 0.264            | 0.274            | 0.008            |       |       |
| 28   | 1       | 0.673            | 0.571            | 0.192            |       |       |
| 29   | 1       | 0.567            | -0.394           | 0.190            |       |       |
| 30   | 1       | 0.544            | 0.222            | 0.162            |       |       |
| 31   | 1       | 0.203            | 2.783            | 0.070            |       |       |
| 32   | 1       | 0.724            | 0.142            | 0.217            |       |       |
| 33   | 1       | 0.302            | 0.538            | 0.034            |       |       |
| 34   | 1       | 0.384            | 0.510            | 0.144            |       |       |
| 35   | 1       | 0.723            | -0.030           | 0.161            |       |       |
| 36   | 1       | 0.825            | 1.928            | 0.308            |       |       |
| 37   | 1       | 0.821            | -0.679           | 0.274            |       |       |
| 38   | 1       | 0.493            | 1.960            | 0.184            |       |       |
| 39   | 1       | 0.844            | 0.426            | 0.216            |       |       |
| 40   | 1       | 0.915            | 0.847            | 0.269            |       |       |
| 41   | 1       | 0.860            | 0.266            | 0.161            |       |       |
| 42   | 1       | 0.738            | 0.558            | 0.300            |       |       |
| 43   | 2       | 1.217            | -2.298           | -0.174           |       |       |
| 44   | 2       | 1.709            | -2.554           | -0.466           |       |       |
| 45   | 4       | 1.637            | -3.336           | -1.498           | 0.517 | 2.542 |
| 46   | 2       | 1.319            | -2.380           | -0.110           |       |       |
| 47   | 2       | 1.481            | -2.039           | 0.675            |       |       |
| 48   | 2       | 1.659            | -3.786           | -0.683           |       |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 49   | 2       | 1.673            | -3.134           | -0.081           |       |       |
| 50   | 2       | 1.324            | -2.364           | -0.003           |       |       |
| 51   | 4       | 1.612            | -2.899           | -1.505           | 0.239 | 1.924 |

**Table O17. ELA Grade 7 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 1    | 1       | 0.909            | 0.426            | 0.138            |       |       |
| 2    | 1       | 0.221            | -1.965           | 0.008            |       |       |
| 3    | 1       | 0.999            | -0.046           | 0.259            |       |       |
| 4    | 1       | 0.608            | 0.335            | 0.124            |       |       |
| 5    | 1       | 0.518            | 0.634            | 0.220            |       |       |
| 6    | 1       | 0.593            | -0.576           | 0.148            |       |       |
| 7    | 1       | 0.900            | -0.117           | 0.165            |       |       |
| 8    | 1       | 0.588            | -0.027           | 0.082            |       |       |
| 9    | 1       | 0.942            | 0.426            | 0.215            |       |       |
| 10   | 1       | 0.643            | 0.096            | 0.163            |       |       |
| 11   | 1       | 0.740            | -0.752           | 0.188            |       |       |
| 12   | 1       | 1.006            | 1.444            | 0.153            |       |       |
| 13   | 1       | 0.760            | 0.004            | 0.232            |       |       |
| 14   | 1       | 0.508            | 0.170            | 0.159            |       |       |
| 15   | 1       | 0.340            | -0.127           | 0.006            |       |       |
| 16   | 1       | 0.673            | 0.300            | 0.135            |       |       |
| 17   | 1       | 0.596            | 0.545            | 0.180            |       |       |
| 18   | 1       | 0.521            | 1.171            | 0.186            |       |       |
| 19   | 1       | 1.373            | -0.384           | 0.249            |       |       |
| 20   | 1       | 0.414            | -0.224           | 0.004            |       |       |
| 21   | 1       | 0.279            | 0.090            | 0.018            |       |       |
| 29   | 1       | 0.332            | 1.490            | 0.119            |       |       |
| 30   | 1       | 0.487            | 0.745            | 0.092            |       |       |
| 31   | 1       | 0.770            | 1.813            | 0.236            |       |       |
| 32   | 1       | 1.185            | 0.627            | 0.254            |       |       |
| 33   | 1       | 1.215            | 1.097            | 0.202            |       |       |
| 34   | 1       | 0.748            | 0.665            | 0.257            |       |       |
| 35   | 1       | 0.722            | -0.558           | 0.157            |       |       |
| 36   | 1       | 0.602            | -0.580           | 0.074            |       |       |
| 37   | 1       | 0.643            | -1.339           | 0.066            |       |       |
| 38   | 1       | 0.346            | 0.828            | 0.215            |       |       |
| 39   | 1       | 0.632            | 0.219            | 0.149            |       |       |
| 40   | 1       | 0.461            | 1.444            | 0.176            |       |       |
| 41   | 1       | 0.643            | -0.068           | 0.174            |       |       |
| 42   | 1       | 0.961            | 0.473            | 0.302            |       |       |
| 43   | 2       | 1.483            | -1.685           | 0.197            |       |       |
| 44   | 2       | 1.828            | -2.308           | -0.305           |       |       |
| 45   | 4       | 1.582            | -2.994           | -1.157           | 0.827 | 2.437 |
| 46   | 2       | 1.612            | -3.167           | -0.427           |       |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 47   | 2       | 1.829            | -2.690           | 0.015            |       |       |
| 48   | 2       | 1.634            | -2.186           | 0.508            |       |       |
| 49   | 2       | 1.694            | -1.889           | 0.237            |       |       |
| 50   | 2       | 1.755            | -1.777           | 0.649            |       |       |
| 51   | 4       | 1.677            | -1.967           | -0.557           | 1.081 | 2.481 |

**Table O18. ELA Grade 8 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 | step4 |
|------|---------|------------------|------------------|------------------|-------|-------|
| 1    | 1       | 1.090            | 0.598            | 0.341            |       |       |
| 2    | 1       | 0.315            | -0.442           | 0.013            |       |       |
| 3    | 1       | 1.088            | -2.314           | 0.075            |       |       |
| 4    | 1       | 0.766            | -1.941           | 0.015            |       |       |
| 5    | 1       | 0.810            | 0.211            | 0.272            |       |       |
| 6    | 1       | 0.580            | -0.934           | 0.064            |       |       |
| 7    | 1       | 0.452            | -1.436           | 0.005            |       |       |
| 8    | 1       | 0.983            | -1.233           | 0.156            |       |       |
| 9    | 1       | 0.601            | -0.354           | 0.137            |       |       |
| 10   | 1       | 0.797            | -0.065           | 0.226            |       |       |
| 11   | 1       | 0.108            | -0.792           | 0.012            |       |       |
| 12   | 1       | 1.324            | -1.115           | 0.201            |       |       |
| 13   | 1       | 0.427            | -1.228           | 0.012            |       |       |
| 14   | 1       | 0.879            | 1.135            | 0.216            |       |       |
| 22   | 1       | 0.990            | -0.337           | 0.240            |       |       |
| 23   | 1       | 0.936            | -0.365           | 0.131            |       |       |
| 24   | 1       | 0.275            | -0.254           | 0.007            |       |       |
| 25   | 1       | 1.329            | 0.459            | 0.186            |       |       |
| 26   | 1       | 1.199            | 0.129            | 0.251            |       |       |
| 27   | 1       | 1.033            | -0.371           | 0.219            |       |       |
| 28   | 1       | 0.456            | -0.257           | 0.004            |       |       |
| 29   | 1       | 0.848            | 0.155            | 0.225            |       |       |
| 30   | 1       | 0.550            | -1.205           | 0.005            |       |       |
| 31   | 1       | 1.182            | 0.125            | 0.288            |       |       |
| 32   | 1       | 0.539            | 0.470            | 0.157            |       |       |
| 33   | 1       | 1.110            | -0.087           | 0.229            |       |       |
| 34   | 1       | 0.980            | 0.212            | 0.193            |       |       |
| 35   | 1       | 0.762            | 0.067            | 0.171            |       |       |
| 36   | 1       | 1.005            | 0.359            | 0.172            |       |       |
| 37   | 1       | 0.707            | 0.300            | 0.197            |       |       |
| 38   | 1       | 0.880            | -0.520           | 0.162            |       |       |
| 39   | 1       | 0.845            | -0.489           | 0.179            |       |       |
| 40   | 1       | 0.519            | -1.138           | 0.006            |       |       |
| 41   | 1       | 0.815            | 0.450            | 0.202            |       |       |
| 42   | 1       | 0.903            | -1.190           | 0.223            |       |       |
| 43   | 2       | 1.191            | -2.071           | -0.273           |       |       |
| 44   | 2       | 1.675            | -2.556           | -0.390           |       |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3  | step4 |
|------|---------|------------------|------------------|------------------|--------|-------|
| 45   | 4       | 1.594            | -3.054           | -1.451           | 0.490  | 2.081 |
| 46   | 2       | 1.440            | -3.558           | -0.327           |        |       |
| 47   | 2       | 1.565            | -2.673           | -0.262           |        |       |
| 48   | 2       | 2.114            | -4.680           | -1.502           |        |       |
| 49   | 2       | 1.943            | -3.541           | -0.780           |        |       |
| 50   | 2       | 1.839            | -2.652           | 0.032            |        |       |
| 51   | 4       | 1.655            | -3.216           | -1.923           | -0.042 | 1.795 |

**Table O19. Mathematics Grade 3 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 0.794            | -0.840           | 0.219            |       |
| 2    | 1       | 0.807            | -0.729           | 0.201            |       |
| 3    | 1       | 1.470            | 1.752            | 0.211            |       |
| 4    | 1       | 0.623            | -2.321           | 0.017            |       |
| 6    | 1       | 1.074            | 0.068            | 0.327            |       |
| 7    | 1       | 0.798            | -0.859           | 0.357            |       |
| 8    | 1       | 0.848            | 0.190            | 0.151            |       |
| 9    | 1       | 0.816            | 0.329            | 0.210            |       |
| 11   | 1       | 0.413            | -3.020           | 0.012            |       |
| 12   | 1       | 0.847            | -1.096           | 0.135            |       |
| 13   | 1       | 0.719            | 0.322            | 0.134            |       |
| 14   | 1       | 0.854            | 0.253            | 0.257            |       |
| 16   | 1       | 0.537            | -0.294           | 0.160            |       |
| 17   | 1       | 1.304            | 0.312            | 0.165            |       |
| 19   | 1       | 1.313            | -0.087           | 0.150            |       |
| 20   | 1       | 1.185            | -0.866           | 0.335            |       |
| 21   | 1       | 1.108            | -0.219           | 0.305            |       |
| 22   | 1       | 1.028            | 0.644            | 0.171            |       |
| 23   | 1       | 0.872            | -1.393           | 0.044            |       |
| 24   | 1       | 1.098            | 0.123            | 0.093            |       |
| 25   | 1       | 1.238            | 0.291            | 0.095            |       |
| 26   | 1       | 0.843            | -0.257           | 0.280            |       |
| 27   | 1       | 0.840            | 0.184            | 0.274            |       |
| 28   | 1       | 0.702            | -0.687           | 0.163            |       |
| 30   | 1       | 1.230            | 1.135            | 0.301            |       |
| 31   | 1       | 0.572            | -2.342           | 0.008            |       |
| 32   | 1       | 0.975            | -0.252           | 0.134            |       |
| 33   | 1       | 1.040            | 0.223            | 0.206            |       |
| 34   | 1       | 0.603            | -2.282           | 0.012            |       |
| 35   | 1       | 0.819            | -1.234           | 0.004            |       |
| 37   | 1       | 0.586            | 0.150            | 0.049            |       |
| 38   | 1       | 1.117            | 0.336            | 0.233            |       |
| 39   | 1       | 0.769            | 0.966            | 0.113            |       |
| 40   | 1       | 1.100            | -0.994           | 0.101            |       |
| 41   | 1       | 1.285            | 0.285            | 0.197            |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3  |
|------|---------|------------------|------------------|------------------|--------|
| 42   | 1       | 1.174            | 0.385            | 0.253            |        |
| 43   | 1       | 1.161            | -0.198           | 0.063            |        |
| 45   | 2       | 1.159            | 0.004            | 1.243            |        |
| 46   | 2       | 0.567            | -1.659           | 0.472            |        |
| 47   | 2       | 0.973            | 0.445            | -1.522           |        |
| 48   | 2       | 1.263            | 1.164            | 2.380            |        |
| 49   | 2       | 1.202            | -0.676           | 0.625            |        |
| 50   | 3       | 0.576            | 2.288            | 0.759            | -1.787 |
| 51   | 3       | 0.596            | 0.875            | 0.255            | -1.004 |
| 52   | 3       | 1.215            | 1.660            | 0.229            | 1.185  |

**Table O20. Mathematics Grade 4 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 0.790            | -1.419           | 0.088            |       |
| 2    | 1       | 1.159            | -0.346           | 0.355            |       |
| 3    | 1       | 1.271            | -0.405           | 0.165            |       |
| 4    | 1       | 1.397            | 0.475            | 0.120            |       |
| 5    | 1       | 1.006            | 0.105            | 0.266            |       |
| 6    | 1       | 0.870            | -0.730           | 0.043            |       |
| 7    | 1       | 0.502            | -0.133           | 0.226            |       |
| 8    | 1       | 0.944            | -0.206           | 0.290            |       |
| 9    | 1       | 1.261            | -0.572           | 0.143            |       |
| 10   | 1       | 1.305            | 0.012            | 0.063            |       |
| 12   | 1       | 1.033            | 0.749            | 0.205            |       |
| 13   | 1       | 1.468            | 0.755            | 0.136            |       |
| 14   | 1       | 0.516            | 0.924            | 0.067            |       |
| 16   | 1       | 1.226            | -0.410           | 0.166            |       |
| 17   | 1       | 1.004            | -0.010           | 0.328            |       |
| 18   | 1       | 0.996            | 0.041            | 0.170            |       |
| 19   | 1       | 0.907            | -0.179           | 0.144            |       |
| 20   | 1       | 0.903            | -0.313           | 0.348            |       |
| 23   | 1       | 0.384            | -1.760           | 0.002            |       |
| 24   | 1       | 0.702            | -0.100           | 0.226            |       |
| 25   | 1       | 0.937            | 0.028            | 0.198            |       |
| 26   | 1       | 0.874            | -0.010           | 0.137            |       |
| 27   | 1       | 0.971            | 0.274            | 0.063            |       |
| 28   | 1       | 0.864            | -0.390           | 0.321            |       |
| 29   | 1       | 1.024            | -0.618           | 0.294            |       |
| 30   | 1       | 1.034            | -0.312           | 0.155            |       |
| 31   | 1       | 0.732            | -0.664           | 0.068            |       |
| 32   | 1       | 0.927            | -0.547           | 0.056            |       |
| 33   | 1       | 1.112            | 0.406            | 0.211            |       |
| 34   | 1       | 0.907            | 0.726            | 0.146            |       |



| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3  |
|------|---------|------------------|------------------|------------------|--------|
| 35   | 1       | 0.646            | 0.272            | 0.130            |        |
| 37   | 1       | 1.169            | -0.332           | 0.063            |        |
| 38   | 1       | 1.326            | -0.423           | 0.118            |        |
| 39   | 1       | 1.224            | 0.292            | 0.239            |        |
| 40   | 1       | 1.052            | 0.469            | 0.108            |        |
| 42   | 1       | 1.173            | 0.367            | 0.438            |        |
| 43   | 1       | 0.896            | -0.384           | 0.094            |        |
| 45   | 1       | 1.379            | 0.046            | 0.103            |        |
| 46   | 2       | 1.001            | 0.138            | 0.503            |        |
| 47   | 2       | 0.911            | -1.681           | 0.055            |        |
| 48   | 2       | 0.939            | -0.556           | -0.467           |        |
| 49   | 2       | 1.231            | 0.134            | 1.428            |        |
| 50   | 2       | 1.327            | -0.405           | 1.016            |        |
| 51   | 2       | 0.689            | -1.130           | 0.558            |        |
| 52   | 3       | 1.292            | 1.488            | 1.071            | 2.900  |
| 53   | 3       | 0.652            | -0.928           | 1.749            | -1.656 |
| 54   | 3       | 1.113            | 0.319            | 0.094            | 0.083  |
| 55   | 3       | 0.939            | 0.404            | 0.146            | -0.041 |

**Table O21. Mathematics Grade 5 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 1.164            | 0.288            | 0.163            |       |
| 2    | 1       | 1.187            | -0.055           | 0.141            |       |
| 3    | 1       | 1.195            | -1.371           | 0.006            |       |
| 4    | 1       | 0.056            | -4.746           | 0.050            |       |
| 5    | 1       | 0.882            | -0.066           | 0.259            |       |
| 6    | 1       | 0.925            | 0.923            | 0.205            |       |
| 8    | 1       | 1.118            | 0.633            | 0.230            |       |
| 9    | 1       | 0.612            | 0.596            | 0.039            |       |
| 10   | 1       | 1.047            | 0.126            | 0.177            |       |
| 11   | 1       | 1.177            | -0.782           | 0.318            |       |
| 13   | 1       | 0.403            | -1.288           | 0.003            |       |
| 14   | 1       | 1.047            | 0.138            | 0.250            |       |
| 15   | 1       | 1.313            | 1.187            | 0.186            |       |
| 16   | 1       | 0.942            | 0.443            | 0.088            |       |
| 17   | 1       | 1.340            | 0.008            | 0.137            |       |
| 18   | 1       | 1.087            | 0.443            | 0.217            |       |
| 19   | 1       | 1.761            | 1.407            | 0.154            |       |
| 20   | 1       | 1.189            | 1.214            | 0.091            |       |
| 23   | 1       | 0.828            | -0.900           | 0.021            |       |
| 24   | 1       | 0.389            | 0.581            | 0.224            |       |
| 25   | 1       | 0.641            | -0.415           | 0.297            |       |
| 26   | 1       | 0.755            | -1.165           | 0.002            |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 27   | 1       | 1.166            | 0.780            | 0.166            |       |
| 28   | 1       | 0.741            | 0.132            | 0.201            |       |
| 29   | 1       | 1.190            | 0.197            | 0.239            |       |
| 31   | 1       | 1.220            | -0.674           | 0.108            |       |
| 33   | 1       | 0.903            | 0.461            | 0.109            |       |
| 34   | 1       | 0.675            | 0.301            | 0.206            |       |
| 36   | 1       | 0.679            | 1.162            | 0.300            |       |
| 37   | 1       | 0.584            | 0.428            | 0.027            |       |
| 39   | 1       | 1.310            | 0.080            | 0.285            |       |
| 40   | 1       | 0.839            | 0.577            | 0.313            |       |
| 41   | 1       | 0.890            | -0.604           | 0.091            |       |
| 42   | 1       | 2.297            | 0.500            | 0.155            |       |
| 43   | 1       | 1.622            | 0.397            | 0.130            |       |
| 44   | 1       | 1.869            | 1.033            | 0.142            |       |
| 45   | 1       | 0.869            | -0.431           | 0.237            |       |
| 46   | 2       | 1.166            | -0.844           | 0.419            |       |
| 47   | 2       | 1.063            | -1.115           | 1.423            |       |
| 48   | 2       | 1.321            | -1.358           | -0.454           |       |
| 49   | 2       | 1.076            | -0.141           | 1.101            |       |
| 50   | 2       | 1.098            | 0.035            | 1.492            |       |
| 51   | 2       | 0.496            | 2.356            | -2.513           |       |
| 52   | 3       | 1.052            | 0.012            | 0.159            | 0.421 |
| 53   | 3       | 1.316            | 1.222            | 1.648            | 2.192 |
| 54   | 3       | 1.173            | 2.390            | 1.341            | 1.102 |
| 55   | 3       | 0.792            | 0.588            | 3.239            | 0.345 |

**Table O22. Mathematics Grade 6 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 0.664            | -0.414           | 0.539            |       |
| 2    | 1       | 0.598            | -0.656           | 0.152            |       |
| 4    | 1       | 0.626            | -0.733           | 0.006            |       |
| 5    | 1       | 0.813            | 0.728            | 0.261            |       |
| 7    | 1       | 0.961            | 0.218            | 0.279            |       |
| 8    | 1       | 1.276            | 1.009            | 0.577            |       |
| 9    | 1       | 1.580            | 2.090            | 0.070            |       |
| 11   | 1       | 0.692            | 0.191            | 0.249            |       |
| 12   | 1       | 1.040            | 0.515            | 0.205            |       |
| 13   | 1       | 1.324            | 0.800            | 0.201            |       |
| 14   | 1       | 0.968            | -0.760           | 0.170            |       |
| 15   | 1       | 1.162            | 0.945            | 0.062            |       |
| 16   | 1       | 1.414            | 1.388            | 0.229            |       |
| 17   | 1       | 1.230            | 1.284            | 0.327            |       |
| 18   | 1       | 0.881            | -0.105           | 0.163            |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3  |
|------|---------|------------------|------------------|------------------|--------|
| 19   | 1       | 1.072            | 0.701            | 0.156            |        |
| 20   | 1       | 0.969            | 0.259            | 0.266            |        |
| 21   | 1       | 1.448            | 0.555            | 0.228            |        |
| 22   | 1       | 0.698            | 0.583            | 0.301            |        |
| 25   | 1       | 0.386            | 0.039            | 0.227            |        |
| 26   | 1       | 1.681            | 1.672            | 0.190            |        |
| 27   | 1       | 1.041            | 0.541            | 0.697            |        |
| 28   | 1       | 1.313            | -0.173           | 0.265            |        |
| 29   | 1       | 1.044            | -0.369           | 0.213            |        |
| 30   | 1       | 1.345            | 1.087            | 0.154            |        |
| 31   | 1       | 1.311            | -0.018           | 0.330            |        |
| 33   | 1       | 1.072            | 0.698            | 0.151            |        |
| 34   | 1       | 1.139            | 0.597            | 0.379            |        |
| 35   | 1       | 1.366            | 1.323            | 0.416            |        |
| 36   | 1       | 1.249            | -0.605           | 0.264            |        |
| 37   | 1       | 0.668            | 2.383            | 0.183            |        |
| 38   | 1       | 1.538            | 0.784            | 0.195            |        |
| 39   | 1       | 1.116            | 1.112            | 0.189            |        |
| 40   | 1       | 0.947            | 0.916            | 0.208            |        |
| 41   | 1       | 1.404            | 0.462            | 0.289            |        |
| 42   | 1       | 0.670            | -0.628           | 0.057            |        |
| 43   | 1       | 0.968            | 1.305            | 0.131            |        |
| 44   | 1       | 0.756            | 2.408            | 0.169            |        |
| 45   | 1       | 1.129            | 1.367            | 0.241            |        |
| 46   | 1       | 0.808            | 0.680            | 0.154            |        |
| 47   | 1       | 0.623            | 1.436            | 0.218            |        |
| 48   | 1       | 0.924            | -1.415           | 0.116            |        |
| 49   | 1       | 1.742            | 0.478            | 0.214            |        |
| 52   | 2       | 1.328            | -1.518           | 1.291            |        |
| 53   | 2       | 0.892            | 1.867            | -0.864           |        |
| 54   | 2       | 0.977            | -0.601           | 0.434            |        |
| 55   | 2       | 1.156            | 1.678            | 0.100            |        |
| 56   | 2       | 1.235            | -0.037           | 1.751            |        |
| 57   | 2       | 1.409            | 1.249            | 1.881            |        |
| 58   | 3       | 0.712            | 1.993            | 0.991            | 0.536  |
| 59   | 3       | 1.103            | 1.226            | -0.455           | 3.134  |
| 60   | 3       | 1.222            | 1.950            | 3.495            | 1.677  |
| 61   | 3       | 0.948            | 0.638            | 1.559            | -0.792 |

**Table O23. Mathematics Grade 7 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 1.192            | 0.038            | 0.346            |       |
| 2    | 1       | 1.379            | 1.343            | 0.243            |       |
| 4    | 1       | 1.749            | 1.254            | 0.292            |       |
| 6    | 1       | 0.569            | -1.587           | 0.004            |       |
| 7    | 1       | 0.819            | 1.324            | 0.256            |       |
| 8    | 1       | 0.902            | 0.637            | 0.239            |       |
| 9    | 1       | 0.965            | 0.835            | 0.215            |       |
| 10   | 1       | 1.119            | 0.720            | 0.171            |       |
| 11   | 1       | 1.342            | 0.029            | 0.322            |       |
| 12   | 1       | 0.719            | 0.462            | 0.236            |       |
| 13   | 1       | 1.090            | 0.780            | 0.241            |       |
| 14   | 1       | 1.272            | 1.242            | 0.124            |       |
| 15   | 1       | 1.501            | 0.862            | 0.225            |       |
| 16   | 1       | 0.638            | 0.166            | 0.245            |       |
| 17   | 1       | 0.717            | 0.587            | 0.271            |       |
| 18   | 1       | 1.521            | 1.488            | 0.177            |       |
| 20   | 1       | 1.346            | 0.274            | 0.221            |       |
| 21   | 1       | 1.621            | 1.129            | 0.265            |       |
| 22   | 1       | 1.275            | 1.268            | 0.199            |       |
| 23   | 1       | 1.287            | 1.212            | 0.303            |       |
| 24   | 1       | 1.565            | 1.543            | 0.214            |       |
| 25   | 1       | 1.303            | -0.261           | 0.189            |       |
| 27   | 1       | 1.069            | 0.054            | 0.294            |       |
| 28   | 1       | 1.306            | 0.699            | 0.227            |       |
| 29   | 1       | 1.276            | 0.668            | 0.171            |       |
| 30   | 1       | 1.531            | 0.733            | 0.248            |       |
| 31   | 1       | 1.331            | 0.625            | 0.206            |       |
| 33   | 1       | 1.349            | -0.042           | 0.228            |       |
| 34   | 1       | 1.322            | 1.469            | 0.262            |       |
| 35   | 1       | 1.633            | 0.754            | 0.202            |       |
| 36   | 1       | 1.676            | 0.690            | 0.238            |       |
| 37   | 1       | 0.730            | 1.118            | 0.174            |       |
| 38   | 1       | 1.576            | 1.109            | 0.269            |       |
| 39   | 1       | 1.076            | 1.627            | 0.218            |       |
| 40   | 1       | 1.206            | 0.413            | 0.222            |       |
| 41   | 1       | 1.159            | 1.190            | 0.194            |       |
| 42   | 1       | 0.636            | 1.531            | 0.344            |       |
| 43   | 1       | 1.270            | 0.151            | 0.257            |       |
| 44   | 1       | 0.881            | 1.305            | 0.303            |       |
| 45   | 1       | 1.257            | 1.116            | 0.172            |       |
| 46   | 1       | 0.587            | -0.243           | 0.050            |       |
| 47   | 1       | 1.863            | 0.526            | 0.228            |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 48   | 1       | 0.949            | 0.744            | 0.289            |       |
| 49   | 1       | 1.287            | 0.822            | 0.237            |       |
| 52   | 2       | 1.120            | 1.851            | 0.371            |       |
| 53   | 2       | 1.862            | 0.502            | 1.072            |       |
| 54   | 2       | 1.270            | -0.914           | 0.502            |       |
| 55   | 2       | 1.022            | -0.244           | 0.992            |       |
| 56   | 2       | 1.616            | 0.978            | 2.778            |       |
| 57   | 2       | 1.042            | -0.247           | 0.124            |       |
| 58   | 3       | 0.746            | 1.222            | 0.390            | 0.819 |
| 59   | 3       | 0.829            | 0.629            | 0.737            | 1.661 |
| 60   | 3       | 1.447            | 0.719            | 0.573            | 2.795 |
| 61   | 3       | 1.207            | 0.709            | -0.038           | 0.459 |

**Table O24. Mathematics Grade 8 OP Item Parameter Estimates**

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 1    | 1       | 0.757            | -1.342           | 0.328            |       |
| 2    | 1       | 1.289            | 0.311            | 0.222            |       |
| 3    | 1       | 0.836            | 0.684            | 0.229            |       |
| 4    | 1       | 0.647            | -0.356           | 0.163            |       |
| 5    | 1       | 1.102            | 0.265            | 0.323            |       |
| 6    | 1       | 1.572            | 0.864            | 0.380            |       |
| 7    | 1       | 0.987            | 0.520            | 0.173            |       |
| 8    | 1       | 0.486            | 0.211            | 0.111            |       |
| 9    | 1       | 0.721            | 0.894            | 0.160            |       |
| 10   | 1       | 0.865            | 0.912            | 0.393            |       |
| 11   | 1       | 0.938            | 0.120            | 0.256            |       |
| 12   | 1       | 1.144            | 0.572            | 0.301            |       |
| 15   | 1       | 1.249            | 1.156            | 0.112            |       |
| 16   | 1       | 1.230            | 1.356            | 0.251            |       |
| 17   | 1       | 0.986            | -0.078           | 0.193            |       |
| 19   | 1       | 0.853            | -0.206           | 0.097            |       |
| 20   | 1       | 1.014            | -0.799           | 0.194            |       |
| 21   | 1       | 1.350            | 1.641            | 0.234            |       |
| 22   | 1       | 0.904            | -0.725           | 0.353            |       |
| 24   | 1       | 0.384            | -1.178           | 0.003            |       |
| 25   | 1       | 1.110            | 0.577            | 0.499            |       |
| 26   | 1       | 0.827            | 0.164            | 0.198            |       |
| 27   | 1       | 0.690            | -0.241           | 0.304            |       |
| 28   | 1       | 1.001            | -0.090           | 0.093            |       |
| 29   | 1       | 0.858            | -0.220           | 0.148            |       |
| 30   | 1       | 0.751            | 0.133            | 0.182            |       |
| 32   | 1       | 1.366            | 1.001            | 0.163            |       |
| 33   | 1       | 1.118            | 1.112            | 0.435            |       |

| Item | Max Pts | a-par /<br>alpha | b-par /<br>step1 | c-par /<br>step2 | step3 |
|------|---------|------------------|------------------|------------------|-------|
| 34   | 1       | 1.315            | 0.341            | 0.226            |       |
| 35   | 1       | 0.928            | 0.159            | 0.316            |       |
| 36   | 1       | 1.242            | 0.628            | 0.275            |       |
| 37   | 1       | 0.859            | -0.215           | 0.321            |       |
| 38   | 1       | 0.992            | 0.240            | 0.242            |       |
| 39   | 1       | 1.248            | 1.348            | 0.308            |       |
| 40   | 1       | 1.044            | 0.533            | 0.243            |       |
| 41   | 1       | 0.797            | -0.702           | 0.311            |       |
| 42   | 1       | 0.935            | -0.358           | 0.233            |       |
| 44   | 1       | 0.776            | 0.567            | 0.200            |       |
| 45   | 1       | 0.684            | 0.335            | 0.169            |       |
| 46   | 1       | 0.776            | 0.608            | 0.225            |       |
| 47   | 1       | 0.790            | 1.077            | 0.242            |       |
| 48   | 1       | 1.111            | 0.652            | 0.208            |       |
| 49   | 1       | 1.264            | 1.003            | 0.311            |       |
| 50   | 1       | 1.291            | 1.380            | 0.231            |       |
| 52   | 2       | 0.729            | -0.105           | 0.708            |       |
| 53   | 2       | 0.877            | 0.281            | 0.529            |       |
| 54   | 2       | 0.875            | 1.275            | -0.647           |       |
| 55   | 2       | 1.156            | 0.745            | -0.642           |       |
| 56   | 2       | 1.313            | 1.018            | 1.211            |       |
| 57   | 2       | 0.914            | 1.201            | -0.546           |       |
| 58   | 3       | 0.872            | 1.414            | 0.455            | 0.164 |
| 59   | 3       | 1.127            | 1.482            | 0.865            | 0.892 |
| 60   | 3       | 1.312            | 0.618            | 1.415            | 1.457 |
| 61   | 3       | 1.286            | 1.652            | 1.966            | 0.472 |

## Appendix P: Derivation and Estimation of Classification Consistency and Accuracy

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### Classification Consistency

Assume that  $\theta$  is a single latent trait measured by a test and denote  $\Phi$  as a latent random variable. When a test  $X$  consists of  $K$  items and its maximum number correct score is  $N$ , the marginal probability of the number correct (NC) score  $x$  is

$$P(X = x) = \int P(X = x | \Phi = \theta) g(\theta) d\theta, \quad x = 0, 1, \dots, N$$

where

$g(\theta)$  is the density of  $\theta$ .

In this report, the marginal distribution  $P(X = x)$  is denoted as  $f(x)$ , and the conditional error distribution  $P(X = x | \Phi = \theta)$  is denoted as  $f(x | \theta)$ . It is assumed that examinees are classified into one of  $H$  mutually exclusive categories on the basis of predetermined  $H - 1$  observed score cutoffs,  $C_1, C_2, \dots, C_{H-1}$ . Let  $L_h$  represent the  $h$ th category into which examinees with  $C_{h-1} \leq X < C_h$  are classified.  $C_0 = 0$  and  $C_H$  = the maximum number-correct score plus one. Then, the conditional and marginal probabilities of each category classification are as follows:

$$P(X \in L_h | \theta) = \sum_{x=C_{h-1}}^{C_h-1} f(x | \theta), \quad h = 1, 2, \dots, H$$

$$P(X \in L_h) = \int \sum_{x=C_{h-1}}^{C_h-1} f(x | \theta) g(\theta) d\theta, \quad h = 1, 2, \dots, H$$

Because obtaining test scores from two independent administrations of New York State tests was not feasible due to item release after each OP administration, a psychometric model was used to obtain the estimated classification consistency indices using test scores from a single administration. Based on the psychometric model, a symmetric  $H$ -by- $H$  contingency table can be constructed. The elements of the  $H$ -by- $H$  contingency table consist of the joint probabilities of the row and column observed category classifications.

That two administrations are independent implies that if  $X_1$  and  $X_2$  represent the raw score random variables on the two administrations, then, conditioned on  $\theta$ ,  $X_1$  and  $X_2$  are independent and identically distributed. Consequently, the conditional bivariate distribution of  $X_1$  and  $X_2$  is

$$f(x_1, x_2 | \theta) = f(x_1 | \theta) f(x_2 | \theta)$$

The marginal bivariate distribution of  $X_1$  and  $X_2$  can be expressed as follows:

$$f(x_1, x_2) = \int f(x_1, x_2 | \theta) f(\theta) d\theta$$

Consistent classification means that both  $X_1$  and  $X_2$  fall in the same category. The conditional probability of falling in the same category on the two administrations is

$$P(X_1 \in L_h, X_2 \in L_h | \theta) = \left[ \sum_{x_1=C_{h-1}}^{C_{h+1}} f(x_1 | \theta) \right]^2, h = 1, 2, \dots, H$$

The agreement index  $P$ , conditional on theta, is obtained by

$$P(\theta) = \sum_{h=1}^H P(X_1 \in L_h, X_2 \in L_h | \theta)$$

The agreement index (classification consistency) can be computed as

$$P = \int P(\theta)g(\theta)d(\theta)$$

The probability of consistent classification by chance,  $P_c$ , is the sum of squared marginal probabilities of each category classification.

$$P_c = \sum_{h=1}^H P(X_1 \in L_h)P(X_2 \in L_h) = \sum_{h=1}^H [P(X_1 \in L_h)]^2$$

Then, Kappa (Cohen, 1960) is

$$k = \frac{P - P_c}{1 - P_c}$$

### Classification Accuracy

Let  $\Gamma_w$  denote true category. When an examinee has an observed score,  $x \in L_h$  ( $h = 1, 2, \dots, H$ ), and a latent score,  $\theta \in \Gamma_w$  ( $w = 1, 2, \dots, H$ ), an accurate classification is made when  $h = w$ . The conditional probability of accurate classification is

$$\gamma(\theta) = P(X \in L_w | \theta),$$

where

$w$  is the category such that  $\theta \in \Gamma_w$

Lee (2008) thoroughly discusses this IRT method for estimating decision indices, including the computational method used to estimate the results when integrating across the latent variable,  $\theta$ .



### **Estimating Classification Indices**

The classification consistency and accuracy estimates were obtained using an open-source software program, IRT-CLASS v2.0 (Lee & Kolen, 2006). Below is a brief description of the files that are used and their purpose. (See the IRT-CLASS v2.0 manual for complete instructions.)

#### **Files needed:**

- Raw-to-Scale score conversion file
  - a. Contains the raw-to-scale score conversions
  - b. This is used to provide both raw and scale score classification estimates, which is useful when the raw-to-scale score transformation is not one-to-one.
- Cut score file
  - a. Contains the cut scores to be used
  - b. Results are provided for all cut scores simultaneously (all performance levels), as well as the estimates based on each of the cut scores separately (Level 3 only).
- Item parameter file
  - a. This contains the IRT model used and item parameter estimates.
  - b. This information is used when calculating the classification indices.
- Theta file
  - a. Contains the theta distribution in terms of quadrature points
  - b. The theta and the item parameter files are used to solve the integrals mentioned above.
- Control card
  - a. This is used to run the program.
  - b. Identifies the names of the four files above and gives a name to the output file

## Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

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Tables Q1–Q12 show the raw-to-scale score conversion tables, while Tables Q13–Q24 show the scale score distributions, by frequency (n-count), percent, cumulative frequency, and cumulative percent. The data in the tables include all students with valid scores.

**Table Q1. ELA Grade 3 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 177         | 54             | 24        | 308         | 9              |
| 1         | 185         | 45             | 25        | 311         | 9              |
| 2         | 193         | 38             | 26        | 314         | 9              |
| 3         | 201         | 32             | 27        | 317         | 9              |
| 4         | 209         | 27             | 28        | 320         | 9              |
| 5         | 217         | 22             | 29        | 323         | 9              |
| 6         | 225         | 19             | 30        | 326         | 9              |
| 7         | 233         | 17             | 31        | 330         | 8              |
| 8         | 241         | 15             | 32        | 333         | 9              |
| 9         | 248         | 13             | 33        | 336         | 9              |
| 10        | 254         | 12             | 34        | 339         | 9              |
| 11        | 260         | 12             | 35        | 343         | 9              |
| 12        | 264         | 11             | 36        | 346         | 9              |
| 13        | 269         | 11             | 37        | 350         | 9              |
| 14        | 273         | 10             | 38        | 354         | 10             |
| 15        | 277         | 10             | 39        | 358         | 10             |
| 16        | 281         | 10             | 40        | 363         | 10             |
| 17        | 284         | 10             | 41        | 368         | 11             |
| 18        | 288         | 10             | 42        | 374         | 12             |
| 19        | 291         | 9              | 43        | 381         | 13             |
| 20        | 295         | 9              | 44        | 390         | 15             |
| 21        | 298         | 9              | 45        | 398         | 17             |
| 22        | 301         | 9              | 46        | 406         | 19             |
| 23        | 305         | 9              | 47        | 414         | 22             |

**Table Q2. ELA Grade 4 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 172         | 48             | 24        | 303         | 9              |
| 1         | 180         | 41             | 25        | 306         | 9              |
| 2         | 188         | 35             | 26        | 309         | 9              |
| 3         | 196         | 30             | 27        | 312         | 9              |
| 4         | 204         | 26             | 28        | 315         | 9              |
| 5         | 212         | 22             | 29        | 320         | 9              |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 6         | 220         | 19             | 30        | 321         | 9              |
| 7         | 228         | 16             | 31        | 324         | 9              |
| 8         | 237         | 14             | 32        | 328         | 9              |
| 9         | 243         | 13             | 33        | 331         | 9              |
| 10        | 249         | 12             | 34        | 334         | 9              |
| 11        | 254         | 11             | 35        | 338         | 9              |
| 12        | 259         | 11             | 36        | 343         | 10             |
| 13        | 263         | 10             | 37        | 345         | 10             |
| 14        | 268         | 10             | 38        | 349         | 10             |
| 15        | 271         | 10             | 39        | 353         | 10             |
| 16        | 275         | 10             | 40        | 358         | 11             |
| 17        | 279         | 10             | 41        | 364         | 12             |
| 18        | 283         | 9              | 42        | 370         | 13             |
| 19        | 287         | 9              | 43        | 377         | 14             |
| 20        | 289         | 9              | 44        | 386         | 16             |
| 21        | 293         | 9              | 45        | 394         | 19             |
| 22        | 296         | 9              | 46        | 402         | 22             |
| 23        | 299         | 9              | 47        | 410         | 25             |

**Table Q3. ELA Grade 5 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 112         | 66             | 29        | 280         | 10             |
| 1         | 120         | 58             | 30        | 283         | 10             |
| 2         | 128         | 51             | 31        | 286         | 9              |
| 3         | 136         | 44             | 32        | 289         | 9              |
| 4         | 144         | 39             | 33        | 292         | 9              |
| 5         | 152         | 34             | 34        | 295         | 9              |
| 6         | 160         | 30             | 35        | 298         | 9              |
| 7         | 168         | 26             | 36        | 301         | 9              |
| 8         | 176         | 23             | 37        | 304         | 9              |
| 9         | 184         | 21             | 38        | 308         | 10             |
| 10        | 192         | 19             | 39        | 311         | 10             |
| 11        | 200         | 17             | 40        | 314         | 10             |
| 12        | 208         | 16             | 41        | 320         | 10             |
| 13        | 216         | 14             | 42        | 321         | 10             |
| 14        | 224         | 13             | 43        | 325         | 10             |
| 15        | 229         | 13             | 44        | 328         | 11             |
| 16        | 234         | 12             | 45        | 332         | 11             |
| 17        | 239         | 12             | 46        | 337         | 11             |
| 18        | 243         | 12             | 47        | 341         | 12             |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 19        | 247         | 11             | 48        | 346         | 12             |
| 20        | 251         | 11             | 49        | 351         | 13             |
| 21        | 254         | 11             | 50        | 357         | 13             |
| 22        | 258         | 11             | 51        | 363         | 14             |
| 23        | 261         | 10             | 52        | 371         | 15             |
| 24        | 265         | 10             | 53        | 380         | 17             |
| 25        | 268         | 10             | 54        | 391         | 20             |
| 26        | 271         | 10             | 55        | 399         | 22             |
| 27        | 274         | 10             | 56        | 407         | 24             |
| 28        | 277         | 10             | 57        | 415         | 27             |

**Table Q4. ELA Grade 6 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 128         | 76             | 29        | 288         | 9              |
| 1         | 136         | 66             | 30        | 291         | 9              |
| 2         | 144         | 57             | 31        | 294         | 9              |
| 3         | 152         | 49             | 32        | 297         | 9              |
| 4         | 161         | 41             | 33        | 300         | 9              |
| 5         | 169         | 35             | 34        | 303         | 9              |
| 6         | 177         | 30             | 35        | 305         | 9              |
| 7         | 185         | 26             | 36        | 308         | 9              |
| 8         | 193         | 22             | 37        | 311         | 9              |
| 9         | 201         | 19             | 38        | 314         | 9              |
| 10        | 209         | 17             | 39        | 320         | 9              |
| 11        | 217         | 15             | 40        | 321         | 9              |
| 12        | 225         | 13             | 41        | 324         | 9              |
| 13        | 231         | 12             | 42        | 327         | 10             |
| 14        | 236         | 12             | 43        | 331         | 10             |
| 15        | 241         | 11             | 44        | 335         | 10             |
| 16        | 245         | 11             | 45        | 338         | 10             |
| 17        | 249         | 10             | 46        | 342         | 11             |
| 18        | 253         | 10             | 47        | 347         | 11             |
| 19        | 257         | 10             | 48        | 352         | 12             |
| 20        | 260         | 10             | 49        | 357         | 12             |
| 21        | 263         | 10             | 50        | 362         | 13             |
| 22        | 267         | 10             | 51        | 369         | 14             |
| 23        | 270         | 9              | 52        | 377         | 16             |
| 24        | 273         | 9              | 53        | 387         | 18             |
| 25        | 276         | 9              | 54        | 395         | 20             |
| 26        | 279         | 9              | 55        | 403         | 23             |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 27        | 283         | 9              | 56        | 411         | 26             |
| 28        | 285         | 9              | 57        | 419         | 29             |

**Table Q5. ELA Grade 7 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 147         | 74             | 29        | 293         | 8              |
| 1         | 154         | 65             | 30        | 295         | 8              |
| 2         | 162         | 55             | 31        | 298         | 8              |
| 3         | 170         | 47             | 32        | 300         | 8              |
| 4         | 178         | 40             | 33        | 303         | 8              |
| 5         | 186         | 33             | 34        | 305         | 8              |
| 6         | 194         | 28             | 35        | 308         | 8              |
| 7         | 202         | 24             | 36        | 311         | 8              |
| 8         | 210         | 20             | 37        | 313         | 8              |
| 9         | 218         | 17             | 38        | 316         | 8              |
| 10        | 226         | 15             | 39        | 318         | 8              |
| 11        | 233         | 13             | 40        | 321         | 8              |
| 12        | 239         | 12             | 41        | 324         | 8              |
| 13        | 244         | 11             | 42        | 327         | 8              |
| 14        | 248         | 11             | 43        | 330         | 9              |
| 15        | 252         | 10             | 44        | 333         | 9              |
| 16        | 256         | 10             | 45        | 337         | 9              |
| 17        | 260         | 9              | 46        | 340         | 9              |
| 18        | 263         | 9              | 47        | 347         | 10             |
| 19        | 266         | 9              | 48        | 348         | 10             |
| 20        | 269         | 9              | 49        | 352         | 11             |
| 21        | 272         | 9              | 50        | 357         | 11             |
| 22        | 275         | 8              | 51        | 363         | 12             |
| 23        | 278         | 8              | 52        | 370         | 14             |
| 24        | 280         | 8              | 53        | 378         | 16             |
| 25        | 283         | 8              | 54        | 389         | 19             |
| 26        | 287         | 8              | 55        | 397         | 22             |
| 27        | 288         | 8              | 56        | 405         | 25             |
| 28        | 291         | 8              | 57        | 413         | 28             |

**Table Q6. ELA Grade 8 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 130         | 69             | 29        | 278         | 8              |
| 1         | 138         | 59             | 30        | 280         | 8              |
| 2         | 146         | 51             | 31        | 284         | 8              |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 3         | 154         | 44             | 32        | 285         | 8              |
| 4         | 161         | 38             | 33        | 288         | 8              |
| 5         | 169         | 32             | 34        | 290         | 8              |
| 6         | 177         | 27             | 35        | 292         | 8              |
| 7         | 185         | 23             | 36        | 295         | 8              |
| 8         | 193         | 19             | 37        | 297         | 8              |
| 9         | 201         | 16             | 38        | 300         | 8              |
| 10        | 209         | 14             | 39        | 302         | 8              |
| 11        | 217         | 12             | 40        | 305         | 8              |
| 12        | 225         | 11             | 41        | 307         | 8              |
| 13        | 229         | 10             | 42        | 310         | 8              |
| 14        | 234         | 10             | 43        | 313         | 8              |
| 15        | 237         | 10             | 44        | 316         | 8              |
| 16        | 241         | 9              | 45        | 319         | 8              |
| 17        | 245         | 9              | 46        | 322         | 8              |
| 18        | 248         | 9              | 47        | 325         | 9              |
| 19        | 251         | 9              | 48        | 329         | 9              |
| 20        | 254         | 8              | 49        | 333         | 10             |
| 21        | 257         | 8              | 50        | 337         | 10             |
| 22        | 260         | 8              | 51        | 343         | 11             |
| 23        | 262         | 8              | 52        | 348         | 12             |
| 24        | 265         | 8              | 53        | 355         | 14             |
| 25        | 268         | 8              | 54        | 365         | 16             |
| 26        | 270         | 8              | 55        | 379         | 21             |
| 27        | 273         | 8              | 56        | 387         | 25             |
| 28        | 275         | 8              | 57        | 395         | 30             |

**Table Q7. Mathematics Grade 3 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 137         | 58             | 29        | 296         | 8              |
| 1         | 145         | 52             | 30        | 298         | 8              |
| 2         | 153         | 47             | 31        | 300         | 8              |
| 3         | 161         | 43             | 32        | 303         | 8              |
| 4         | 170         | 39             | 33        | 305         | 8              |
| 5         | 178         | 35             | 34        | 307         | 8              |
| 6         | 186         | 32             | 35        | 309         | 8              |
| 7         | 194         | 29             | 36        | 312         | 8              |
| 8         | 202         | 26             | 37        | 314         | 8              |
| 9         | 210         | 24             | 38        | 316         | 8              |
| 10        | 218         | 21             | 39        | 319         | 8              |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 11        | 226         | 19             | 40        | 321         | 8              |
| 12        | 234         | 17             | 41        | 323         | 8              |
| 13        | 241         | 15             | 42        | 326         | 8              |
| 14        | 247         | 14             | 43        | 329         | 8              |
| 15        | 252         | 13             | 44        | 331         | 8              |
| 16        | 257         | 12             | 45        | 334         | 9              |
| 17        | 261         | 12             | 46        | 340         | 9              |
| 18        | 265         | 11             | 47        | 341         | 9              |
| 19        | 268         | 11             | 48        | 344         | 10             |
| 20        | 271         | 10             | 49        | 349         | 10             |
| 21        | 275         | 10             | 50        | 353         | 11             |
| 22        | 278         | 9              | 51        | 358         | 12             |
| 23        | 280         | 9              | 52        | 365         | 13             |
| 24        | 285         | 9              | 53        | 373         | 15             |
| 25        | 286         | 9              | 54        | 384         | 19             |
| 26        | 288         | 8              | 55        | 392         | 22             |
| 27        | 291         | 8              | 56        | 401         | 27             |
| 28        | 293         | 8              |           |             |                |

**Table Q8. Mathematics Grade 4 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 143         | 68             | 32        | 297         | 7              |
| 1         | 151         | 62             | 33        | 299         | 7              |
| 2         | 159         | 57             | 34        | 300         | 7              |
| 3         | 167         | 51             | 35        | 302         | 7              |
| 4         | 176         | 46             | 36        | 304         | 7              |
| 5         | 184         | 41             | 37        | 306         | 7              |
| 6         | 192         | 37             | 38        | 308         | 7              |
| 7         | 200         | 33             | 39        | 309         | 7              |
| 8         | 208         | 29             | 40        | 311         | 7              |
| 9         | 216         | 26             | 41        | 314         | 7              |
| 10        | 225         | 22             | 42        | 315         | 7              |
| 11        | 234         | 19             | 43        | 317         | 7              |
| 12        | 241         | 16             | 44        | 319         | 7              |
| 13        | 247         | 15             | 45        | 321         | 7              |
| 14        | 252         | 13             | 46        | 323         | 7              |
| 15        | 256         | 12             | 47        | 325         | 7              |
| 16        | 260         | 11             | 48        | 328         | 7              |
| 17        | 263         | 10             | 49        | 330         | 8              |
| 18        | 266         | 10             | 50        | 333         | 8              |

## Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 19        | 269         | 9              | 51        | 336         | 8              |
| 20        | 272         | 9              | 52        | 341         | 9              |
| 21        | 275         | 8              | 53        | 342         | 9              |
| 22        | 277         | 8              | 54        | 345         | 10             |
| 23        | 279         | 8              | 55        | 349         | 10             |
| 24        | 281         | 8              | 56        | 354         | 11             |
| 25        | 283         | 8              | 57        | 360         | 12             |
| 26        | 286         | 7              | 58        | 367         | 14             |
| 27        | 288         | 7              | 59        | 375         | 16             |
| 28        | 289         | 7              | 60        | 388         | 21             |
| 29        | 291         | 7              | 61        | 396         | 24             |
| 30        | 293         | 7              | 62        | 405         | 28             |
| 31        | 295         | 7              |           |             |                |

**Table Q9. Mathematics Grade 5 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 153         | 78             | 31        | 308         | 7              |
| 1         | 161         | 68             | 32        | 310         | 7              |
| 2         | 169         | 60             | 33        | 312         | 7              |
| 3         | 177         | 52             | 34        | 315         | 7              |
| 4         | 185         | 45             | 35        | 317         | 7              |
| 5         | 193         | 39             | 36        | 319         | 7              |
| 6         | 201         | 34             | 37        | 321         | 7              |
| 7         | 210         | 28             | 38        | 323         | 7              |
| 8         | 218         | 24             | 39        | 325         | 7              |
| 9         | 226         | 21             | 40        | 327         | 7              |
| 10        | 236         | 17             | 41        | 329         | 7              |
| 11        | 244         | 15             | 42        | 331         | 7              |
| 12        | 250         | 14             | 43        | 334         | 7              |
| 13        | 256         | 13             | 44        | 336         | 7              |
| 14        | 260         | 12             | 45        | 338         | 7              |
| 15        | 265         | 11             | 46        | 340         | 7              |
| 16        | 268         | 11             | 47        | 343         | 7              |
| 17        | 272         | 10             | 48        | 346         | 8              |
| 18        | 275         | 10             | 49        | 348         | 8              |
| 19        | 279         | 9              | 50        | 351         | 8              |
| 20        | 282         | 9              | 51        | 354         | 8              |
| 21        | 284         | 9              | 52        | 357         | 9              |
| 22        | 287         | 9              | 53        | 361         | 10             |
| 23        | 290         | 8              | 54        | 365         | 10             |



# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 24        | 294         | 8              | 55        | 370         | 11             |
| 25        | 295         | 8              | 56        | 375         | 13             |
| 26        | 297         | 8              | 57        | 382         | 14             |
| 27        | 299         | 8              | 58        | 392         | 18             |
| 28        | 302         | 7              | 59        | 400         | 21             |
| 29        | 304         | 7              | 60        | 408         | 24             |
| 30        | 306         | 7              | 61        | 416         | 28             |

**Table Q10. Mathematics Grade 6 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 132         | 165            | 34        | 316         | 7              |
| 1         | 140         | 142            | 35        | 318         | 7              |
| 2         | 148         | 123            | 36        | 320         | 7              |
| 3         | 157         | 104            | 37        | 322         | 7              |
| 4         | 165         | 89             | 38        | 324         | 7              |
| 5         | 173         | 77             | 39        | 325         | 7              |
| 6         | 181         | 66             | 40        | 327         | 7              |
| 7         | 189         | 56             | 41        | 329         | 7              |
| 8         | 197         | 48             | 42        | 331         | 7              |
| 9         | 205         | 41             | 43        | 333         | 7              |
| 10        | 213         | 35             | 44        | 335         | 7              |
| 11        | 221         | 30             | 45        | 337         | 7              |
| 12        | 230         | 25             | 46        | 340         | 7              |
| 13        | 242         | 21             | 47        | 341         | 7              |
| 14        | 252         | 17             | 48        | 343         | 7              |
| 15        | 259         | 16             | 49        | 345         | 7              |
| 16        | 265         | 14             | 50        | 347         | 7              |
| 17        | 270         | 13             | 51        | 349         | 7              |
| 18        | 275         | 12             | 52        | 351         | 7              |
| 19        | 279         | 11             | 53        | 354         | 7              |
| 20        | 284         | 10             | 54        | 356         | 7              |
| 21        | 286         | 10             | 55        | 359         | 8              |
| 22        | 289         | 10             | 56        | 362         | 8              |
| 23        | 292         | 9              | 57        | 365         | 8              |
| 24        | 295         | 9              | 58        | 368         | 9              |
| 25        | 297         | 9              | 59        | 371         | 9              |
| 26        | 300         | 8              | 60        | 375         | 9              |
| 27        | 302         | 8              | 61        | 379         | 10             |
| 28        | 304         | 8              | 62        | 384         | 11             |
| 29        | 306         | 8              | 63        | 390         | 13             |
| 30        | 308         | 7              | 64        | 398         | 15             |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 31        | 310         | 7              | 65        | 406         | 18             |
| 32        | 312         | 7              | 66        | 414         | 21             |
| 33        | 314         | 7              | 67        | 423         | 25             |

**Table Q11. Mathematics Grade 7 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 150         | 112            | 35        | 318         | 6              |
| 1         | 158         | 98             | 36        | 319         | 6              |
| 2         | 166         | 86             | 37        | 321         | 6              |
| 3         | 174         | 75             | 38        | 322         | 6              |
| 4         | 181         | 67             | 39        | 324         | 6              |
| 5         | 189         | 59             | 40        | 325         | 5              |
| 6         | 197         | 52             | 41        | 327         | 5              |
| 7         | 205         | 46             | 42        | 328         | 5              |
| 8         | 213         | 40             | 43        | 330         | 5              |
| 9         | 220         | 36             | 44        | 331         | 5              |
| 10        | 228         | 32             | 45        | 333         | 5              |
| 11        | 236         | 28             | 46        | 334         | 5              |
| 12        | 244         | 24             | 47        | 336         | 6              |
| 13        | 256         | 20             | 48        | 337         | 6              |
| 14        | 265         | 16             | 49        | 339         | 6              |
| 15        | 271         | 14             | 50        | 340         | 6              |
| 16        | 276         | 13             | 51        | 342         | 6              |
| 17        | 280         | 11             | 52        | 344         | 6              |
| 18        | 284         | 10             | 53        | 346         | 6              |
| 19        | 287         | 10             | 54        | 348         | 6              |
| 20        | 290         | 9              | 55        | 350         | 6              |
| 21        | 293         | 8              | 56        | 352         | 6              |
| 22        | 295         | 8              | 57        | 354         | 7              |
| 23        | 297         | 8              | 58        | 356         | 7              |
| 24        | 299         | 7              | 59        | 359         | 7              |
| 25        | 301         | 7              | 60        | 362         | 8              |
| 26        | 303         | 7              | 61        | 365         | 8              |
| 27        | 305         | 7              | 62        | 369         | 9              |
| 28        | 307         | 7              | 63        | 373         | 10             |
| 29        | 309         | 6              | 64        | 379         | 11             |
| 30        | 310         | 6              | 65        | 386         | 13             |
| 31        | 312         | 6              | 66        | 394         | 16             |
| 32        | 313         | 6              | 67        | 402         | 19             |
| 33        | 315         | 6              | 68        | 409         | 23             |
| 34        | 316         | 6              |           |             |                |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

**Table Q12. Mathematics Grade 8 RSSS Table**

| Raw Score | Scale Score | Standard Error | Raw Score | Scale Score | Standard Error |
|-----------|-------------|----------------|-----------|-------------|----------------|
| 0         | 132         | 139            | 35        | 312         | 7              |
| 1         | 140         | 126            | 36        | 313         | 7              |
| 2         | 148         | 114            | 37        | 315         | 7              |
| 3         | 156         | 103            | 38        | 317         | 7              |
| 4         | 164         | 93             | 39        | 318         | 7              |
| 5         | 172         | 84             | 40        | 320         | 6              |
| 6         | 180         | 75             | 41        | 322         | 6              |
| 7         | 188         | 67             | 42        | 323         | 6              |
| 8         | 196         | 59             | 43        | 325         | 6              |
| 9         | 204         | 51             | 44        | 326         | 6              |
| 10        | 212         | 44             | 45        | 328         | 6              |
| 11        | 220         | 38             | 46        | 330         | 6              |
| 12        | 228         | 32             | 47        | 331         | 6              |
| 13        | 236         | 26             | 48        | 333         | 6              |
| 14        | 246         | 21             | 49        | 334         | 6              |
| 15        | 254         | 18             | 50        | 336         | 6              |
| 16        | 260         | 15             | 51        | 338         | 6              |
| 17        | 266         | 14             | 52        | 340         | 7              |
| 18        | 270         | 13             | 53        | 341         | 7              |
| 19        | 274         | 12             | 54        | 343         | 7              |
| 20        | 278         | 11             | 55        | 345         | 7              |
| 21        | 281         | 10             | 56        | 349         | 7              |
| 22        | 284         | 10             | 57        | 350         | 7              |
| 23        | 287         | 9              | 58        | 352         | 8              |
| 24        | 289         | 9              | 59        | 355         | 8              |
| 25        | 292         | 9              | 60        | 357         | 8              |
| 26        | 294         | 8              | 61        | 361         | 9              |
| 27        | 296         | 8              | 62        | 364         | 9              |
| 28        | 299         | 8              | 63        | 369         | 10             |
| 29        | 301         | 8              | 64        | 374         | 12             |
| 30        | 303         | 8              | 65        | 381         | 14             |
| 31        | 305         | 7              | 66        | 391         | 17             |
| 32        | 306         | 7              | 67        | 399         | 21             |
| 33        | 308         | 7              | 68        | 407         | 25             |
| 34        | 310         | 7              |           |             |                |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

**Table Q13. ELA Grade 3 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 177         | 31    | 0.02% | 31         | 0.02% |
| 185         | 56    | 0.03% | 87         | 0.05% |
| 193         | 152   | 0.08% | 239        | 0.13% |
| 201         | 318   | 0.18% | 557        | 0.31% |
| 209         | 727   | 0.40% | 1,284      | 0.71% |
| 217         | 1,154 | 0.64% | 2,438      | 1.35% |
| 225         | 1,702 | 0.94% | 4,140      | 2.30% |
| 233         | 2,152 | 1.19% | 6,292      | 3.49% |
| 241         | 2,524 | 1.40% | 8,816      | 4.89% |
| 248         | 2,830 | 1.57% | 11,646     | 6.46% |
| 254         | 2,955 | 1.64% | 14,601     | 8.10% |
| 260         | 3,117 | 1.73% | 17,718     | 9.83% |
| 264         | 3,476 | 1.93% | 21,194     | 11.8% |
| 269         | 3,694 | 2.05% | 24,888     | 13.8% |
| 273         | 3,988 | 2.21% | 28,876     | 16.0% |
| 277         | 4,360 | 2.42% | 33,236     | 18.4% |
| 281         | 4,616 | 2.56% | 37,852     | 21.0% |
| 284         | 4,951 | 2.75% | 42,803     | 23.7% |
| 288         | 5,401 | 3.00% | 48,204     | 26.7% |
| 291         | 5,505 | 3.05% | 53,709     | 29.8% |
| 295         | 5,889 | 3.27% | 59,598     | 33.1% |
| 298         | 5,892 | 3.27% | 65,490     | 36.3% |
| 301         | 6,245 | 3.46% | 71,735     | 39.8% |
| 305         | 6,492 | 3.60% | 78,227     | 43.4% |
| 308         | 6,510 | 3.61% | 84,737     | 47.0% |
| 311         | 6,770 | 3.75% | 91,507     | 50.8% |
| 314         | 6,597 | 3.66% | 98,104     | 54.4% |
| 317         | 6,589 | 3.65% | 104,693    | 58.1% |
| 320         | 6,684 | 3.71% | 111,377    | 61.8% |
| 323         | 6,602 | 3.66% | 117,979    | 65.4% |
| 326         | 6,589 | 3.65% | 124,568    | 69.1% |
| 330         | 6,193 | 3.43% | 130,761    | 72.5% |
| 333         | 6,209 | 3.44% | 136,970    | 76.0% |
| 336         | 6,156 | 3.41% | 143,126    | 79.4% |
| 339         | 5,822 | 3.23% | 148,948    | 82.6% |
| 343         | 5,195 | 2.88% | 154,143    | 85.5% |
| 346         | 4,827 | 2.68% | 158,970    | 88.2% |
| 350         | 4,440 | 2.46% | 163,410    | 90.6% |
| 354         | 3,886 | 2.16% | 167,296    | 92.8% |
| 358         | 3,360 | 1.86% | 170,656    | 94.6% |
| 363         | 2,920 | 1.62% | 173,576    | 96.3% |
| 368         | 2,316 | 1.28% | 175,892    | 97.6% |

## Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 374         | 1,807 | 1.00% | 177,699    | 98.6% |
| 381         | 1,250 | 0.69% | 178,949    | 99.2% |
| 390         | 766   | 0.42% | 179,715    | 99.7% |
| 398         | 383   | 0.21% | 180,098    | 99.9% |
| 406         | 165   | 0.09% | 180,263    | 100%  |
| 414         | 40    | 0.02% | 180,303    | 100%  |

**Table Q14. ELA Grade 4 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 172         | 15    | 0.01% | 15         | 0.01% |
| 180         | 31    | 0.02% | 46         | 0.03% |
| 188         | 108   | 0.06% | 154        | 0.09% |
| 196         | 230   | 0.13% | 384        | 0.22% |
| 204         | 463   | 0.26% | 847        | 0.48% |
| 212         | 756   | 0.43% | 1,603      | 0.91% |
| 220         | 1,127 | 0.64% | 2,730      | 1.54% |
| 228         | 1,488 | 0.84% | 4,218      | 2.38% |
| 237         | 1,757 | 0.99% | 5,975      | 3.37% |
| 243         | 2,275 | 1.28% | 8,250      | 4.66% |
| 249         | 2,504 | 1.41% | 10,754     | 6.07% |
| 254         | 2,849 | 1.61% | 13,603     | 7.68% |
| 259         | 3,269 | 1.85% | 16,872     | 9.53% |
| 263         | 3,567 | 2.01% | 20,439     | 11.5% |
| 268         | 3,989 | 2.25% | 24,428     | 13.8% |
| 271         | 4,293 | 2.42% | 28,721     | 16.2% |
| 275         | 4,506 | 2.54% | 33,227     | 18.8% |
| 279         | 4,796 | 2.71% | 38,023     | 21.5% |
| 283         | 5,048 | 2.85% | 43,071     | 24.3% |
| 287         | 5,193 | 2.93% | 48,264     | 27.3% |
| 289         | 5,477 | 3.09% | 53,741     | 30.3% |
| 293         | 5,784 | 3.27% | 59,525     | 33.6% |
| 296         | 5,943 | 3.36% | 65,468     | 37.0% |
| 299         | 6,156 | 3.48% | 71,624     | 40.4% |
| 303         | 6,390 | 3.61% | 78,014     | 44.1% |
| 306         | 6,450 | 3.64% | 84,464     | 47.7% |
| 309         | 6,567 | 3.71% | 91,031     | 51.4% |
| 312         | 6,835 | 3.86% | 97,866     | 55.3% |
| 315         | 6,941 | 3.92% | 104,807    | 59.2% |
| 320         | 6,809 | 3.84% | 111,616    | 63.0% |
| 321         | 6,911 | 3.90% | 118,527    | 66.9% |
| 324         | 6,879 | 3.88% | 125,406    | 70.8% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 328         | 6,723 | 3.80% | 132,129    | 74.6% |
| 331         | 6,635 | 3.75% | 138,764    | 78.4% |
| 334         | 6,046 | 3.41% | 144,810    | 81.8% |
| 338         | 5,652 | 3.19% | 150,462    | 85.0% |
| 343         | 5,305 | 3.00% | 155,767    | 88.0% |
| 345         | 4,965 | 2.80% | 160,732    | 90.8% |
| 349         | 4,171 | 2.36% | 164,903    | 93.1% |
| 353         | 3,533 | 2.00% | 168,436    | 95.1% |
| 358         | 2,800 | 1.58% | 171,236    | 96.7% |
| 364         | 2,210 | 1.25% | 173,446    | 97.9% |
| 370         | 1,594 | 0.90% | 175,040    | 98.8% |
| 377         | 1,034 | 0.58% | 176,074    | 99.4% |
| 386         | 620   | 0.35% | 176,694    | 99.8% |
| 394         | 275   | 0.16% | 176,969    | 99.9% |
| 402         | 104   | 0.06% | 177,073    | 100%  |
| 410         | 19    | 0.01% | 177,092    | 100%  |

**Table Q15. ELA Grade 5 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 112         | 9     | 0.01% | 9          | 0.01% |
| 120         | 14    | 0.01% | 23         | 0.01% |
| 128         | 11    | 0.01% | 34         | 0.02% |
| 136         | 32    | 0.02% | 66         | 0.04% |
| 144         | 53    | 0.03% | 119        | 0.07% |
| 152         | 141   | 0.08% | 260        | 0.16% |
| 160         | 208   | 0.12% | 468        | 0.28% |
| 168         | 389   | 0.23% | 857        | 0.51% |
| 176         | 515   | 0.31% | 1,372      | 0.82% |
| 184         | 737   | 0.44% | 2,109      | 1.26% |
| 192         | 961   | 0.57% | 3,070      | 1.83% |
| 200         | 1,137 | 0.68% | 4,207      | 2.51% |
| 208         | 1,253 | 0.75% | 5,460      | 3.26% |
| 216         | 1,407 | 0.84% | 6,867      | 4.10% |
| 224         | 1,554 | 0.93% | 8,421      | 5.03% |
| 229         | 1,668 | 1.00% | 10,089     | 6.03% |
| 234         | 1,782 | 1.06% | 11,871     | 7.09% |
| 239         | 1,910 | 1.14% | 13,781     | 8.23% |
| 243         | 2,057 | 1.23% | 15,838     | 9.46% |
| 247         | 2,231 | 1.33% | 18,069     | 10.8% |
| 251         | 2,428 | 1.45% | 20,497     | 12.2% |
| 254         | 2,555 | 1.53% | 23,052     | 13.8% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 258         | 2,827 | 1.69% | 25,879     | 15.5% |
| 261         | 2,844 | 1.70% | 28,723     | 17.2% |
| 265         | 3,147 | 1.88% | 31,870     | 19.0% |
| 268         | 3,280 | 1.96% | 35,150     | 21.0% |
| 271         | 3,680 | 2.20% | 38,830     | 23.2% |
| 274         | 3,848 | 2.30% | 42,678     | 25.5% |
| 277         | 4,043 | 2.42% | 46,721     | 27.9% |
| 280         | 4,409 | 2.63% | 51,130     | 30.5% |
| 283         | 4,647 | 2.78% | 55,777     | 33.3% |
| 286         | 4,846 | 2.89% | 60,623     | 36.2% |
| 289         | 4,973 | 2.97% | 65,596     | 39.2% |
| 292         | 5,129 | 3.06% | 70,725     | 42.2% |
| 295         | 5,371 | 3.21% | 76,096     | 45.5% |
| 298         | 5,626 | 3.36% | 81,722     | 48.8% |
| 301         | 5,738 | 3.43% | 87,460     | 52.2% |
| 304         | 5,846 | 3.49% | 93,306     | 55.7% |
| 308         | 5,960 | 3.56% | 99,266     | 59.3% |
| 311         | 6,094 | 3.64% | 105,360    | 62.9% |
| 314         | 6,161 | 3.68% | 111,521    | 66.6% |
| 320         | 6,161 | 3.68% | 117,682    | 70.3% |
| 321         | 6,116 | 3.65% | 123,798    | 73.9% |
| 325         | 6,002 | 3.59% | 129,800    | 77.5% |
| 328         | 5,751 | 3.44% | 135,551    | 81.0% |
| 332         | 5,367 | 3.21% | 140,918    | 84.2% |
| 337         | 5,103 | 3.05% | 146,021    | 87.2% |
| 341         | 4,576 | 2.73% | 150,597    | 90.0% |
| 346         | 4,118 | 2.46% | 154,715    | 92.4% |
| 351         | 3,528 | 2.11% | 158,243    | 94.5% |
| 357         | 2,950 | 1.76% | 161,193    | 96.3% |
| 363         | 2,308 | 1.38% | 163,501    | 97.7% |
| 371         | 1,650 | 0.99% | 165,151    | 98.7% |
| 380         | 1,129 | 0.67% | 166,280    | 99.3% |
| 391         | 687   | 0.41% | 166,967    | 99.7% |
| 399         | 321   | 0.19% | 167,288    | 99.9% |
| 407         | 99    | 0.06% | 167,387    | 100%  |
| 415         | 22    | 0.01% | 167,409    | 100%  |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

**Table Q16. ELA Grade 6 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 128         | 5     | 0.00% | 5          | 0.00% |
| 136         | 19    | 0.01% | 24         | 0.01% |
| 144         | 23    | 0.01% | 47         | 0.03% |
| 152         | 30    | 0.02% | 77         | 0.05% |
| 161         | 56    | 0.03% | 133        | 0.08% |
| 169         | 144   | 0.09% | 277        | 0.17% |
| 177         | 262   | 0.16% | 539        | 0.32% |
| 185         | 377   | 0.23% | 916        | 0.55% |
| 193         | 624   | 0.38% | 1,540      | 0.93% |
| 201         | 801   | 0.48% | 2,341      | 1.41% |
| 209         | 1,005 | 0.61% | 3,346      | 2.02% |
| 217         | 1,257 | 0.76% | 4,603      | 2.77% |
| 225         | 1,369 | 0.82% | 5,972      | 3.60% |
| 231         | 1,620 | 0.98% | 7,592      | 4.57% |
| 236         | 1,823 | 1.10% | 9,415      | 5.67% |
| 241         | 1,981 | 1.19% | 11,396     | 6.86% |
| 245         | 2,198 | 1.32% | 13,594     | 8.19% |
| 249         | 2,253 | 1.36% | 15,847     | 9.54% |
| 253         | 2,441 | 1.47% | 18,288     | 11.0% |
| 257         | 2,653 | 1.60% | 20,941     | 12.6% |
| 260         | 2,752 | 1.66% | 23,693     | 14.3% |
| 263         | 3,170 | 1.91% | 26,863     | 16.2% |
| 267         | 3,288 | 1.98% | 30,151     | 18.2% |
| 270         | 3,408 | 2.05% | 33,559     | 20.2% |
| 273         | 3,657 | 2.20% | 37,216     | 22.4% |
| 276         | 3,764 | 2.27% | 40,980     | 24.7% |
| 279         | 4,086 | 2.46% | 45,066     | 27.1% |
| 283         | 4,239 | 2.55% | 49,305     | 29.7% |
| 285         | 4,502 | 2.71% | 53,807     | 32.4% |
| 288         | 4,653 | 2.80% | 58,460     | 35.2% |
| 291         | 5,018 | 3.02% | 63,478     | 38.2% |
| 294         | 5,130 | 3.09% | 68,608     | 41.3% |
| 297         | 5,299 | 3.19% | 73,907     | 44.5% |
| 300         | 5,537 | 3.33% | 79,444     | 47.8% |
| 303         | 5,669 | 3.41% | 85,113     | 51.3% |
| 305         | 5,811 | 3.50% | 90,924     | 54.8% |
| 308         | 5,873 | 3.54% | 96,797     | 58.3% |
| 311         | 5,975 | 3.60% | 102,772    | 61.9% |
| 314         | 6,057 | 3.65% | 108,829    | 65.5% |
| 320         | 5,999 | 3.61% | 114,828    | 69.2% |
| 321         | 6,032 | 3.63% | 120,860    | 72.8% |
| 324         | 5,760 | 3.47% | 126,620    | 76.3% |



# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 327         | 5,668 | 3.41% | 132,288    | 79.7% |
| 331         | 5,372 | 3.24% | 137,660    | 82.9% |
| 335         | 5,076 | 3.06% | 142,736    | 86.0% |
| 338         | 4,727 | 2.85% | 147,463    | 88.8% |
| 342         | 4,185 | 2.52% | 151,648    | 91.3% |
| 347         | 3,757 | 2.26% | 155,405    | 93.6% |
| 352         | 3,073 | 1.85% | 158,478    | 95.4% |
| 357         | 2,524 | 1.52% | 161,002    | 97.0% |
| 362         | 2,012 | 1.21% | 163,014    | 98.2% |
| 369         | 1,320 | 0.79% | 164,334    | 99.0% |
| 377         | 824   | 0.50% | 165,158    | 99.5% |
| 387         | 511   | 0.31% | 165,669    | 99.8% |
| 395         | 250   | 0.15% | 165,919    | 99.9% |
| 403         | 90    | 0.05% | 166,009    | 100%  |
| 411         | 29    | 0.02% | 166,038    | 100%  |
| 419         | 2     | 0.00% | 166,040    | 100%  |

**Table Q17. ELA Grade 7 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 147         | 11    | 0.01% | 11         | 0.01% |
| 154         | 13    | 0.01% | 24         | 0.02% |
| 162         | 33    | 0.02% | 57         | 0.04% |
| 170         | 41    | 0.03% | 98         | 0.06% |
| 178         | 98    | 0.06% | 196        | 0.13% |
| 186         | 200   | 0.13% | 396        | 0.25% |
| 194         | 377   | 0.24% | 773        | 0.49% |
| 202         | 582   | 0.37% | 1,355      | 0.87% |
| 210         | 821   | 0.53% | 2,176      | 1.39% |
| 218         | 1,094 | 0.70% | 3,270      | 2.09% |
| 226         | 1,365 | 0.87% | 4,635      | 2.97% |
| 233         | 1,524 | 0.98% | 6,159      | 3.94% |
| 239         | 1,744 | 1.12% | 7,903      | 5.06% |
| 244         | 1,958 | 1.25% | 9,861      | 6.31% |
| 248         | 2,127 | 1.36% | 11,988     | 7.67% |
| 252         | 2,220 | 1.42% | 14,208     | 9.09% |
| 256         | 2,412 | 1.54% | 16,620     | 10.6% |
| 260         | 2,462 | 1.58% | 19,082     | 12.2% |
| 263         | 2,702 | 1.73% | 21,784     | 13.9% |
| 266         | 2,796 | 1.79% | 24,580     | 15.7% |
| 269         | 2,790 | 1.79% | 27,370     | 17.5% |
| 272         | 2,986 | 1.91% | 30,356     | 19.4% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 275         | 3,172 | 2.03% | 33,528     | 21.5% |
| 278         | 3,400 | 2.18% | 36,928     | 23.6% |
| 280         | 3,475 | 2.22% | 40,403     | 25.9% |
| 283         | 3,580 | 2.29% | 43,983     | 28.1% |
| 287         | 3,646 | 2.33% | 47,629     | 30.5% |
| 288         | 3,906 | 2.50% | 51,535     | 33.0% |
| 291         | 3,809 | 2.44% | 55,344     | 35.4% |
| 293         | 4,138 | 2.65% | 59,482     | 38.1% |
| 295         | 4,111 | 2.63% | 63,593     | 40.7% |
| 298         | 4,263 | 2.73% | 67,856     | 43.4% |
| 300         | 4,390 | 2.81% | 72,246     | 46.2% |
| 303         | 4,631 | 2.96% | 76,877     | 49.2% |
| 305         | 4,629 | 2.96% | 81,506     | 52.2% |
| 308         | 4,716 | 3.02% | 86,222     | 55.2% |
| 311         | 4,753 | 3.04% | 90,975     | 58.2% |
| 313         | 4,878 | 3.12% | 95,853     | 61.3% |
| 316         | 4,851 | 3.10% | 100,704    | 64.5% |
| 318         | 5,029 | 3.22% | 105,733    | 67.7% |
| 321         | 4,954 | 3.17% | 110,687    | 70.8% |
| 324         | 5,057 | 3.24% | 115,744    | 74.1% |
| 327         | 4,862 | 3.11% | 120,606    | 77.2% |
| 330         | 4,755 | 3.04% | 125,361    | 80.2% |
| 333         | 4,657 | 2.98% | 130,018    | 83.2% |
| 337         | 4,464 | 2.86% | 134,482    | 86.1% |
| 340         | 4,351 | 2.78% | 138,833    | 88.9% |
| 347         | 3,915 | 2.51% | 142,748    | 91.4% |
| 348         | 3,496 | 2.24% | 146,244    | 93.6% |
| 352         | 3,004 | 1.92% | 149,248    | 95.5% |
| 357         | 2,401 | 1.54% | 151,649    | 97.1% |
| 363         | 1,813 | 1.16% | 153,462    | 98.2% |
| 370         | 1,323 | 0.85% | 154,785    | 99.1% |
| 378         | 765   | 0.49% | 155,550    | 99.6% |
| 389         | 448   | 0.29% | 155,998    | 99.8% |
| 397         | 185   | 0.12% | 156,183    | 100%  |
| 405         | 55    | 0.04% | 156,238    | 100%  |
| 413         | 10    | 0.01% | 156,248    | 100%  |

Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

**Table Q18. ELA Grade 8 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 130         | 16    | 0.01% | 16         | 0.01% |
| 138         | 14    | 0.01% | 30         | 0.02% |
| 146         | 24    | 0.02% | 54         | 0.04% |
| 154         | 24    | 0.02% | 78         | 0.05% |
| 161         | 41    | 0.03% | 119        | 0.08% |
| 169         | 85    | 0.06% | 204        | 0.14% |
| 177         | 151   | 0.10% | 355        | 0.24% |
| 185         | 241   | 0.16% | 596        | 0.40% |
| 193         | 328   | 0.22% | 924        | 0.61% |
| 201         | 454   | 0.30% | 1,378      | 0.91% |
| 209         | 532   | 0.35% | 1,910      | 1.27% |
| 217         | 701   | 0.46% | 2,611      | 1.73% |
| 225         | 752   | 0.50% | 3,363      | 2.23% |
| 229         | 934   | 0.62% | 4,297      | 2.85% |
| 234         | 967   | 0.64% | 5,264      | 3.49% |
| 237         | 1,129 | 0.75% | 6,393      | 4.24% |
| 241         | 1,272 | 0.84% | 7,665      | 5.08% |
| 245         | 1,319 | 0.87% | 8,984      | 5.96% |
| 248         | 1,463 | 0.97% | 10,447     | 6.93% |
| 251         | 1,517 | 1.01% | 11,964     | 7.93% |
| 254         | 1,624 | 1.08% | 13,588     | 9.01% |
| 257         | 1,675 | 1.11% | 15,263     | 10.1% |
| 260         | 1,804 | 1.20% | 17,067     | 11.3% |
| 262         | 1,856 | 1.23% | 18,923     | 12.5% |
| 265         | 1,970 | 1.31% | 20,893     | 13.9% |
| 268         | 2,055 | 1.36% | 22,948     | 15.2% |
| 270         | 2,221 | 1.47% | 25,169     | 16.7% |
| 273         | 2,320 | 1.54% | 27,489     | 18.2% |
| 275         | 2,444 | 1.62% | 29,933     | 19.8% |
| 278         | 2,622 | 1.74% | 32,555     | 21.6% |
| 280         | 2,738 | 1.82% | 35,293     | 23.4% |
| 284         | 2,880 | 1.91% | 38,173     | 25.3% |
| 285         | 3,219 | 2.13% | 41,392     | 27.4% |
| 288         | 3,317 | 2.20% | 44,709     | 29.6% |
| 290         | 3,576 | 2.37% | 48,285     | 32.0% |
| 292         | 3,680 | 2.44% | 51,965     | 34.4% |
| 295         | 3,906 | 2.59% | 55,871     | 37.0% |
| 297         | 4,101 | 2.72% | 59,972     | 39.8% |
| 300         | 4,326 | 2.87% | 64,298     | 42.6% |
| 302         | 4,576 | 3.03% | 68,874     | 45.7% |
| 305         | 4,743 | 3.14% | 73,617     | 48.8% |
| 307         | 4,981 | 3.30% | 78,598     | 52.1% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 310         | 5,077 | 3.37% | 83,675     | 55.5% |
| 313         | 5,340 | 3.54% | 89,015     | 59.0% |
| 316         | 5,593 | 3.71% | 94,608     | 62.7% |
| 319         | 5,736 | 3.80% | 100,344    | 66.5% |
| 322         | 5,937 | 3.94% | 106,281    | 70.5% |
| 325         | 6,050 | 4.01% | 112,331    | 74.5% |
| 329         | 6,050 | 4.01% | 118,381    | 78.5% |
| 333         | 6,135 | 4.07% | 124,516    | 82.5% |
| 337         | 5,973 | 3.96% | 130,489    | 86.5% |
| 343         | 5,596 | 3.71% | 136,085    | 90.2% |
| 348         | 4,842 | 3.21% | 140,927    | 93.4% |
| 355         | 4,158 | 2.76% | 145,085    | 96.2% |
| 365         | 2,940 | 1.95% | 148,025    | 98.1% |
| 379         | 1,849 | 1.23% | 149,874    | 99.4% |
| 387         | 767   | 0.51% | 150,641    | 99.9% |
| 395         | 208   | 0.14% | 150,849    | 100%  |

**Table Q19. Mathematics Grade 3 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 137         | 6     | 0.00% | 6          | 0.00% |
| 145         | 11    | 0.01% | 17         | 0.01% |
| 153         | 21    | 0.01% | 38         | 0.02% |
| 161         | 29    | 0.02% | 67         | 0.04% |
| 170         | 82    | 0.05% | 149        | 0.08% |
| 178         | 171   | 0.09% | 320        | 0.18% |
| 186         | 322   | 0.18% | 642        | 0.36% |
| 194         | 564   | 0.31% | 1,206      | 0.67% |
| 202         | 856   | 0.47% | 2,062      | 1.14% |
| 210         | 1,250 | 0.69% | 3,312      | 1.83% |
| 218         | 1,576 | 0.87% | 4,888      | 2.70% |
| 226         | 1,944 | 1.08% | 6,832      | 3.78% |
| 234         | 2,251 | 1.24% | 9,083      | 5.02% |
| 241         | 2,455 | 1.36% | 11,538     | 6.38% |
| 247         | 2,690 | 1.49% | 14,228     | 7.87% |
| 252         | 2,995 | 1.66% | 17,223     | 9.52% |
| 257         | 3,120 | 1.73% | 20,343     | 11.3% |
| 261         | 3,321 | 1.84% | 23,664     | 13.1% |
| 265         | 3,361 | 1.86% | 27,025     | 14.9% |
| 268         | 3,469 | 1.92% | 30,494     | 16.9% |
| 271         | 3,715 | 2.05% | 34,209     | 18.9% |
| 275         | 3,854 | 2.13% | 38,063     | 21.0% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 278         | 3,913 | 2.16% | 41,976     | 23.2% |
| 280         | 3,976 | 2.20% | 45,952     | 25.4% |
| 285         | 4,125 | 2.28% | 50,077     | 27.7% |
| 286         | 4,159 | 2.30% | 54,236     | 30.0% |
| 288         | 4,232 | 2.34% | 58,468     | 32.3% |
| 291         | 4,224 | 2.34% | 62,692     | 34.7% |
| 293         | 4,283 | 2.37% | 66,975     | 37.0% |
| 296         | 4,451 | 2.46% | 71,426     | 39.5% |
| 298         | 4,276 | 2.36% | 75,702     | 41.9% |
| 300         | 4,334 | 2.40% | 80,036     | 44.3% |
| 303         | 4,271 | 2.36% | 84,307     | 46.6% |
| 305         | 4,394 | 2.43% | 88,701     | 49.1% |
| 307         | 4,374 | 2.42% | 93,075     | 51.5% |
| 309         | 4,367 | 2.42% | 97,442     | 53.9% |
| 312         | 4,345 | 2.40% | 101,787    | 56.3% |
| 314         | 4,353 | 2.41% | 106,140    | 58.7% |
| 316         | 4,270 | 2.36% | 110,410    | 61.1% |
| 319         | 4,450 | 2.46% | 114,860    | 63.5% |
| 321         | 4,399 | 2.43% | 119,259    | 66.0% |
| 323         | 4,475 | 2.47% | 123,734    | 68.4% |
| 326         | 4,505 | 2.49% | 128,239    | 70.9% |
| 329         | 4,451 | 2.46% | 132,690    | 73.4% |
| 331         | 4,450 | 2.46% | 137,140    | 75.8% |
| 334         | 4,462 | 2.47% | 141,602    | 78.3% |
| 340         | 4,598 | 2.54% | 146,200    | 80.9% |
| 341         | 4,486 | 2.48% | 150,686    | 83.3% |
| 344         | 4,370 | 2.42% | 155,056    | 85.7% |
| 349         | 4,167 | 2.30% | 159,223    | 88.1% |
| 353         | 4,074 | 2.25% | 163,297    | 90.3% |
| 358         | 4,000 | 2.21% | 167,297    | 92.5% |
| 365         | 3,766 | 2.08% | 171,063    | 94.6% |
| 373         | 3,424 | 1.89% | 174,487    | 96.5% |
| 384         | 2,855 | 1.58% | 177,342    | 98.1% |
| 392         | 2,276 | 1.26% | 179,618    | 99.3% |
| 401         | 1,206 | 0.67% | 180,824    | 100%  |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

**Table Q20. Mathematics Grade 4 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 143         | 3     | 0.00% | 3          | 0.00% |
| 151         | 10    | 0.01% | 13         | 0.01% |
| 159         | 11    | 0.01% | 24         | 0.01% |
| 167         | 39    | 0.02% | 63         | 0.04% |
| 176         | 160   | 0.09% | 223        | 0.13% |
| 184         | 340   | 0.19% | 563        | 0.32% |
| 192         | 580   | 0.33% | 1,143      | 0.65% |
| 200         | 1,011 | 0.57% | 2,154      | 1.22% |
| 208         | 1,453 | 0.82% | 3,607      | 2.04% |
| 216         | 2,020 | 1.14% | 5,627      | 3.18% |
| 225         | 2,455 | 1.39% | 8,082      | 4.56% |
| 234         | 2,752 | 1.55% | 10,834     | 6.12% |
| 241         | 2,927 | 1.65% | 13,761     | 7.77% |
| 247         | 3,011 | 1.70% | 16,772     | 9.47% |
| 252         | 3,018 | 1.70% | 19,790     | 11.2% |
| 256         | 2,995 | 1.69% | 22,785     | 12.9% |
| 260         | 2,945 | 1.66% | 25,730     | 14.5% |
| 263         | 2,978 | 1.68% | 28,708     | 16.2% |
| 266         | 2,922 | 1.65% | 31,630     | 17.9% |
| 269         | 2,954 | 1.67% | 34,584     | 19.5% |
| 272         | 2,918 | 1.65% | 37,502     | 21.2% |
| 275         | 2,877 | 1.62% | 40,379     | 22.8% |
| 277         | 2,841 | 1.60% | 43,220     | 24.4% |
| 279         | 2,871 | 1.62% | 46,091     | 26.0% |
| 281         | 2,861 | 1.62% | 48,952     | 27.6% |
| 283         | 2,922 | 1.65% | 51,874     | 29.3% |
| 286         | 2,883 | 1.63% | 54,757     | 30.9% |
| 288         | 2,939 | 1.66% | 57,696     | 32.6% |
| 289         | 2,848 | 1.61% | 60,544     | 34.2% |
| 291         | 3,002 | 1.69% | 63,546     | 35.9% |
| 293         | 3,018 | 1.70% | 66,564     | 37.6% |
| 295         | 2,983 | 1.68% | 69,547     | 39.3% |
| 297         | 3,086 | 1.74% | 72,633     | 41.0% |
| 299         | 3,153 | 1.78% | 75,786     | 42.8% |
| 300         | 3,130 | 1.77% | 78,916     | 44.5% |
| 302         | 3,106 | 1.75% | 82,022     | 46.3% |
| 304         | 3,267 | 1.84% | 85,289     | 48.1% |
| 306         | 3,246 | 1.83% | 88,535     | 50.0% |
| 308         | 3,265 | 1.84% | 91,800     | 51.8% |
| 309         | 3,371 | 1.90% | 95,171     | 53.7% |
| 311         | 3,594 | 2.03% | 98,765     | 55.8% |
| 314         | 3,384 | 1.91% | 102,149    | 57.7% |

## Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 315         | 3,580 | 2.02% | 105,729    | 59.7% |
| 317         | 3,600 | 2.03% | 109,329    | 61.7% |
| 319         | 3,625 | 2.05% | 112,954    | 63.8% |
| 321         | 3,638 | 2.05% | 116,592    | 65.8% |
| 323         | 3,701 | 2.09% | 120,293    | 67.9% |
| 325         | 3,869 | 2.18% | 124,162    | 70.1% |
| 328         | 3,977 | 2.25% | 128,139    | 72.3% |
| 330         | 4,043 | 2.28% | 132,182    | 74.6% |
| 333         | 4,096 | 2.31% | 136,278    | 76.9% |
| 336         | 4,018 | 2.27% | 140,296    | 79.2% |
| 341         | 4,105 | 2.32% | 144,401    | 81.5% |
| 342         | 4,134 | 2.33% | 148,535    | 83.8% |
| 345         | 4,181 | 2.36% | 152,716    | 86.2% |
| 349         | 4,211 | 2.38% | 156,927    | 88.6% |
| 354         | 4,037 | 2.28% | 160,964    | 90.9% |
| 360         | 4,006 | 2.26% | 164,970    | 93.1% |
| 367         | 3,682 | 2.08% | 168,652    | 95.2% |
| 375         | 3,315 | 1.87% | 171,967    | 97.1% |
| 388         | 2,718 | 1.53% | 174,685    | 98.6% |
| 396         | 1,777 | 1.00% | 176,462    | 99.6% |
| 405         | 685   | 0.39% | 177,147    | 100%  |

**Table Q21. Mathematics Grade 5 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 153         | 6     | 0.00% | 6          | 0.00% |
| 161         | 19    | 0.01% | 25         | 0.01% |
| 169         | 28    | 0.02% | 53         | 0.03% |
| 177         | 77    | 0.05% | 130        | 0.08% |
| 185         | 199   | 0.12% | 329        | 0.20% |
| 193         | 479   | 0.29% | 808        | 0.48% |
| 201         | 803   | 0.48% | 1,611      | 0.97% |
| 210         | 1,301 | 0.78% | 2,912      | 1.75% |
| 218         | 1,783 | 1.07% | 4,695      | 2.81% |
| 226         | 2,177 | 1.30% | 6,872      | 4.12% |
| 236         | 2,508 | 1.50% | 9,380      | 5.62% |
| 244         | 2,739 | 1.64% | 12,119     | 7.26% |
| 250         | 2,995 | 1.80% | 15,114     | 9.06% |
| 256         | 3,053 | 1.83% | 18,167     | 10.9% |
| 260         | 3,155 | 1.89% | 21,322     | 12.8% |
| 265         | 3,234 | 1.94% | 24,556     | 14.7% |
| 268         | 3,360 | 2.01% | 27,916     | 16.7% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 272         | 3,471 | 2.08% | 31,387     | 18.8% |
| 275         | 3,435 | 2.06% | 34,822     | 20.9% |
| 279         | 3,726 | 2.23% | 38,548     | 23.1% |
| 282         | 3,784 | 2.27% | 42,332     | 25.4% |
| 284         | 3,777 | 2.26% | 46,109     | 27.6% |
| 287         | 3,830 | 2.30% | 49,939     | 29.9% |
| 290         | 3,936 | 2.36% | 53,875     | 32.3% |
| 294         | 3,928 | 2.35% | 57,803     | 34.6% |
| 295         | 3,975 | 2.38% | 61,778     | 37.0% |
| 297         | 4,097 | 2.46% | 65,875     | 39.5% |
| 299         | 4,017 | 2.41% | 69,892     | 41.9% |
| 302         | 4,004 | 2.40% | 73,896     | 44.3% |
| 304         | 3,997 | 2.40% | 77,893     | 46.7% |
| 306         | 3,966 | 2.38% | 81,859     | 49.1% |
| 308         | 3,850 | 2.31% | 85,709     | 51.4% |
| 310         | 3,853 | 2.31% | 89,562     | 53.7% |
| 312         | 3,743 | 2.24% | 93,305     | 55.9% |
| 315         | 3,674 | 2.20% | 96,979     | 58.1% |
| 317         | 3,667 | 2.20% | 100,646    | 60.3% |
| 319         | 3,606 | 2.16% | 104,252    | 62.5% |
| 321         | 3,553 | 2.13% | 107,805    | 64.6% |
| 323         | 3,546 | 2.13% | 111,351    | 66.7% |
| 325         | 3,434 | 2.06% | 114,785    | 68.8% |
| 327         | 3,379 | 2.03% | 118,164    | 70.8% |
| 329         | 3,381 | 2.03% | 121,545    | 72.9% |
| 331         | 3,295 | 1.97% | 124,840    | 74.8% |
| 334         | 3,194 | 1.91% | 128,034    | 76.7% |
| 336         | 3,137 | 1.88% | 131,171    | 78.6% |
| 338         | 3,205 | 1.92% | 134,376    | 80.5% |
| 340         | 3,079 | 1.85% | 137,455    | 82.4% |
| 343         | 3,005 | 1.80% | 140,460    | 84.2% |
| 346         | 2,798 | 1.68% | 143,258    | 85.9% |
| 348         | 2,804 | 1.68% | 146,062    | 87.5% |
| 351         | 2,679 | 1.61% | 148,741    | 89.2% |
| 354         | 2,610 | 1.56% | 151,351    | 90.7% |
| 357         | 2,461 | 1.48% | 153,812    | 92.2% |
| 361         | 2,406 | 1.44% | 156,218    | 93.6% |
| 365         | 2,092 | 1.25% | 158,310    | 94.9% |
| 370         | 2,008 | 1.20% | 160,318    | 96.1% |
| 375         | 1,786 | 1.07% | 162,104    | 97.2% |
| 382         | 1,465 | 0.88% | 163,569    | 98.0% |
| 392         | 1,227 | 0.74% | 164,796    | 98.8% |
| 400         | 970   | 0.58% | 165,766    | 99.4% |



# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 408         | 696   | 0.42% | 166,462    | 99.8% |
| 416         | 376   | 0.23% | 166,838    | 100%  |

**Table Q22. Mathematics Grade 6 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 132         | 8     | 0.00% | 8          | 0.00% |
| 140         | 11    | 0.01% | 19         | 0.01% |
| 148         | 7     | 0.00% | 26         | 0.02% |
| 157         | 20    | 0.01% | 46         | 0.03% |
| 165         | 48    | 0.03% | 94         | 0.06% |
| 173         | 117   | 0.07% | 211        | 0.13% |
| 181         | 217   | 0.13% | 428        | 0.26% |
| 189         | 382   | 0.23% | 810        | 0.49% |
| 197         | 815   | 0.50% | 1,625      | 0.99% |
| 205         | 1,300 | 0.79% | 2,925      | 1.78% |
| 213         | 1,997 | 1.22% | 4,922      | 3.00% |
| 221         | 2,725 | 1.66% | 7,647      | 4.66% |
| 230         | 3,440 | 2.10% | 11,087     | 6.76% |
| 242         | 3,929 | 2.40% | 15,016     | 9.16% |
| 252         | 4,256 | 2.60% | 19,272     | 11.8% |
| 259         | 4,611 | 2.81% | 23,883     | 14.6% |
| 265         | 4,702 | 2.87% | 28,585     | 17.4% |
| 270         | 4,590 | 2.80% | 33,175     | 20.2% |
| 275         | 4,668 | 2.85% | 37,843     | 23.1% |
| 279         | 4,581 | 2.79% | 42,424     | 25.9% |
| 284         | 4,370 | 2.67% | 46,794     | 28.5% |
| 286         | 4,334 | 2.64% | 51,128     | 31.2% |
| 289         | 4,345 | 2.65% | 55,473     | 33.8% |
| 292         | 4,311 | 2.63% | 59,784     | 36.5% |
| 295         | 4,000 | 2.44% | 63,784     | 38.9% |
| 297         | 3,983 | 2.43% | 67,767     | 41.3% |
| 300         | 3,813 | 2.33% | 71,580     | 43.7% |
| 302         | 3,802 | 2.32% | 75,382     | 46.0% |
| 304         | 3,544 | 2.16% | 78,926     | 48.1% |
| 306         | 3,533 | 2.16% | 82,459     | 50.3% |
| 308         | 3,410 | 2.08% | 85,869     | 52.4% |
| 310         | 3,337 | 2.04% | 89,206     | 54.4% |
| 312         | 3,326 | 2.03% | 92,532     | 56.4% |
| 314         | 3,221 | 1.96% | 95,753     | 58.4% |
| 316         | 3,103 | 1.89% | 98,856     | 60.3% |
| 318         | 3,069 | 1.87% | 101,925    | 62.2% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 320         | 2,980 | 1.82% | 104,905    | 64.0% |
| 322         | 2,961 | 1.81% | 107,866    | 65.8% |
| 324         | 2,832 | 1.73% | 110,698    | 67.5% |
| 325         | 2,797 | 1.71% | 113,495    | 69.2% |
| 327         | 2,766 | 1.69% | 116,261    | 70.9% |
| 329         | 2,680 | 1.63% | 118,941    | 72.6% |
| 331         | 2,579 | 1.57% | 121,520    | 74.1% |
| 333         | 2,635 | 1.61% | 124,155    | 75.7% |
| 335         | 2,620 | 1.60% | 126,775    | 77.3% |
| 337         | 2,498 | 1.52% | 129,273    | 78.9% |
| 340         | 2,573 | 1.57% | 131,846    | 80.4% |
| 341         | 2,399 | 1.46% | 134,245    | 81.9% |
| 343         | 2,333 | 1.42% | 136,578    | 83.3% |
| 345         | 2,342 | 1.43% | 138,920    | 84.7% |
| 347         | 2,179 | 1.33% | 141,099    | 86.1% |
| 349         | 2,227 | 1.36% | 143,326    | 87.4% |
| 351         | 2,112 | 1.29% | 145,438    | 88.7% |
| 354         | 2,108 | 1.29% | 147,546    | 90.0% |
| 356         | 2,005 | 1.22% | 149,551    | 91.2% |
| 359         | 1,842 | 1.12% | 151,393    | 92.4% |
| 362         | 1,827 | 1.11% | 153,220    | 93.5% |
| 365         | 1,700 | 1.04% | 154,920    | 94.5% |
| 368         | 1,579 | 0.96% | 156,499    | 95.5% |
| 371         | 1,439 | 0.88% | 157,938    | 96.3% |
| 375         | 1,328 | 0.81% | 159,266    | 97.2% |
| 379         | 1,140 | 0.70% | 160,406    | 97.9% |
| 384         | 1,024 | 0.62% | 161,430    | 98.5% |
| 390         | 833   | 0.51% | 162,263    | 99.0% |
| 398         | 701   | 0.43% | 162,964    | 99.4% |
| 406         | 500   | 0.31% | 163,464    | 99.7% |
| 414         | 324   | 0.20% | 163,788    | 99.9% |
| 423         | 139   | 0.08% | 163,927    | 100%  |

**Table Q23. Mathematics Grade 7 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 150         | 13    | 0.01% | 13         | 0.01% |
| 158         | 13    | 0.01% | 26         | 0.02% |
| 166         | 14    | 0.01% | 40         | 0.03% |
| 174         | 55    | 0.04% | 95         | 0.06% |
| 181         | 108   | 0.07% | 203        | 0.13% |
| 189         | 236   | 0.16% | 439        | 0.29% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 197         | 528   | 0.35% | 967        | 0.64% |
| 205         | 869   | 0.57% | 1,836      | 1.21% |
| 213         | 1,463 | 0.96% | 3,299      | 2.17% |
| 220         | 2,156 | 1.42% | 5,455      | 3.59% |
| 228         | 2,904 | 1.91% | 8,359      | 5.50% |
| 236         | 3,661 | 2.41% | 12,020     | 7.91% |
| 244         | 4,248 | 2.80% | 16,268     | 10.7% |
| 256         | 4,638 | 3.05% | 20,906     | 13.8% |
| 265         | 4,849 | 3.19% | 25,755     | 17.0% |
| 271         | 4,633 | 3.05% | 30,388     | 20.0% |
| 276         | 4,624 | 3.04% | 35,012     | 23.0% |
| 280         | 4,402 | 2.90% | 39,414     | 25.9% |
| 284         | 4,140 | 2.73% | 43,554     | 28.7% |
| 287         | 3,949 | 2.60% | 47,503     | 31.3% |
| 290         | 3,783 | 2.49% | 51,286     | 33.8% |
| 293         | 3,563 | 2.35% | 54,849     | 36.1% |
| 295         | 3,446 | 2.27% | 58,295     | 38.4% |
| 297         | 3,198 | 2.11% | 61,493     | 40.5% |
| 299         | 3,142 | 2.07% | 64,635     | 42.6% |
| 301         | 2,896 | 1.91% | 67,531     | 44.5% |
| 303         | 2,871 | 1.89% | 70,402     | 46.3% |
| 305         | 2,830 | 1.86% | 73,232     | 48.2% |
| 307         | 2,654 | 1.75% | 75,886     | 50.0% |
| 309         | 2,701 | 1.78% | 78,587     | 51.7% |
| 310         | 2,538 | 1.67% | 81,125     | 53.4% |
| 312         | 2,567 | 1.69% | 83,692     | 55.1% |
| 313         | 2,563 | 1.69% | 86,255     | 56.8% |
| 315         | 2,485 | 1.64% | 88,740     | 58.4% |
| 316         | 2,333 | 1.54% | 91,073     | 60.0% |
| 318         | 2,382 | 1.57% | 93,455     | 61.5% |
| 319         | 2,291 | 1.51% | 95,746     | 63.0% |
| 321         | 2,205 | 1.45% | 97,951     | 64.5% |
| 322         | 2,252 | 1.48% | 100,203    | 66.0% |
| 324         | 2,159 | 1.42% | 102,362    | 67.4% |
| 325         | 2,140 | 1.41% | 104,502    | 68.8% |
| 327         | 2,205 | 1.45% | 106,707    | 70.2% |
| 328         | 2,141 | 1.41% | 108,848    | 71.7% |
| 330         | 2,186 | 1.44% | 111,034    | 73.1% |
| 331         | 2,108 | 1.39% | 113,142    | 74.5% |
| 333         | 2,111 | 1.39% | 115,253    | 75.9% |
| 334         | 2,049 | 1.35% | 117,302    | 77.2% |
| 336         | 2,035 | 1.34% | 119,337    | 78.6% |
| 337         | 2,098 | 1.38% | 121,435    | 79.9% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 339         | 1,936 | 1.27% | 123,371    | 81.2% |
| 340         | 1,984 | 1.31% | 125,355    | 82.5% |
| 342         | 1,961 | 1.29% | 127,316    | 83.8% |
| 344         | 1,969 | 1.30% | 129,285    | 85.1% |
| 346         | 1,992 | 1.31% | 131,277    | 86.4% |
| 348         | 1,960 | 1.29% | 133,237    | 87.7% |
| 350         | 1,912 | 1.26% | 135,149    | 89.0% |
| 352         | 1,821 | 1.20% | 136,970    | 90.2% |
| 354         | 1,793 | 1.18% | 138,763    | 91.4% |
| 356         | 1,769 | 1.16% | 140,532    | 92.5% |
| 359         | 1,699 | 1.12% | 142,231    | 93.6% |
| 362         | 1,627 | 1.07% | 143,858    | 94.7% |
| 365         | 1,679 | 1.11% | 145,537    | 95.8% |
| 369         | 1,465 | 0.96% | 147,002    | 96.8% |
| 373         | 1,351 | 0.89% | 148,353    | 97.7% |
| 379         | 1,173 | 0.77% | 149,526    | 98.4% |
| 386         | 1,038 | 0.68% | 150,564    | 99.1% |
| 394         | 754   | 0.50% | 151,318    | 99.6% |
| 402         | 433   | 0.29% | 151,751    | 99.9% |
| 409         | 146   | 0.10% | 151,897    | 100%  |

**Table Q24. Mathematics Grade 8 Scale Score Frequency Distribution**

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 132         | 12    | 0.01% | 12         | 0.01% |
| 140         | 10    | 0.01% | 22         | 0.02% |
| 148         | 20    | 0.02% | 42         | 0.04% |
| 156         | 27    | 0.02% | 69         | 0.06% |
| 164         | 71    | 0.06% | 140        | 0.12% |
| 172         | 137   | 0.12% | 277        | 0.24% |
| 180         | 281   | 0.24% | 558        | 0.47% |
| 188         | 519   | 0.44% | 1,077      | 0.92% |
| 196         | 943   | 0.80% | 2,020      | 1.72% |
| 204         | 1,410 | 1.20% | 3,430      | 2.92% |
| 212         | 2,038 | 1.73% | 5,468      | 4.65% |
| 220         | 2,592 | 2.20% | 8,060      | 6.85% |
| 228         | 3,112 | 2.65% | 11,172     | 9.50% |
| 236         | 3,395 | 2.89% | 14,567     | 12.4% |
| 246         | 3,668 | 3.12% | 18,235     | 15.5% |
| 254         | 3,639 | 3.09% | 21,874     | 18.6% |
| 260         | 3,684 | 3.13% | 25,558     | 21.7% |
| 266         | 3,591 | 3.05% | 29,149     | 24.8% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale Score | Freq. | Pct.  | Cumulative |       |
|-------------|-------|-------|------------|-------|
|             |       |       | Freq.      | Pct.  |
| 270         | 3,588 | 3.05% | 32,737     | 27.8% |
| 274         | 3,421 | 2.91% | 36,158     | 30.7% |
| 278         | 3,355 | 2.85% | 39,513     | 33.6% |
| 281         | 3,329 | 2.83% | 42,842     | 36.4% |
| 284         | 3,145 | 2.67% | 45,987     | 39.1% |
| 287         | 3,098 | 2.63% | 49,085     | 41.7% |
| 289         | 3,020 | 2.57% | 52,105     | 44.3% |
| 292         | 2,917 | 2.48% | 55,022     | 46.8% |
| 294         | 2,788 | 2.37% | 57,810     | 49.1% |
| 296         | 2,797 | 2.38% | 60,607     | 51.5% |
| 299         | 2,600 | 2.21% | 63,207     | 53.7% |
| 301         | 2,637 | 2.24% | 65,844     | 56.0% |
| 303         | 2,481 | 2.11% | 68,325     | 58.1% |
| 305         | 2,423 | 2.06% | 70,748     | 60.1% |
| 306         | 2,424 | 2.06% | 73,172     | 62.2% |
| 308         | 2,339 | 1.99% | 75,511     | 64.2% |
| 310         | 2,246 | 1.91% | 77,757     | 66.1% |
| 312         | 2,096 | 1.78% | 79,853     | 67.9% |
| 313         | 1,951 | 1.66% | 81,804     | 69.5% |
| 315         | 1,916 | 1.63% | 83,720     | 71.2% |
| 317         | 1,782 | 1.51% | 85,502     | 72.7% |
| 318         | 1,811 | 1.54% | 87,313     | 74.2% |
| 320         | 1,704 | 1.45% | 89,017     | 75.7% |
| 322         | 1,636 | 1.39% | 90,653     | 77.1% |
| 323         | 1,569 | 1.33% | 92,222     | 78.4% |
| 325         | 1,461 | 1.24% | 93,683     | 79.6% |
| 326         | 1,441 | 1.22% | 95,124     | 80.9% |
| 328         | 1,430 | 1.22% | 96,554     | 82.1% |
| 330         | 1,313 | 1.12% | 97,867     | 83.2% |
| 331         | 1,383 | 1.18% | 99,250     | 84.4% |
| 333         | 1,235 | 1.05% | 100,485    | 85.4% |
| 334         | 1,175 | 1.00% | 101,660    | 86.4% |
| 336         | 1,194 | 1.01% | 102,854    | 87.4% |
| 338         | 1,113 | 0.95% | 103,967    | 88.4% |
| 340         | 1,055 | 0.90% | 105,022    | 89.3% |
| 341         | 1,028 | 0.87% | 106,050    | 90.1% |
| 343         | 1,033 | 0.88% | 107,083    | 91.0% |
| 345         | 1,005 | 0.85% | 108,088    | 91.9% |
| 349         | 951   | 0.81% | 109,039    | 92.7% |
| 350         | 903   | 0.77% | 109,942    | 93.5% |
| 352         | 950   | 0.81% | 110,892    | 94.3% |
| 355         | 913   | 0.78% | 111,805    | 95.0% |
| 357         | 839   | 0.71% | 112,644    | 95.8% |

# Appendix Q: Raw-to-Scale Score and Scale Score Frequency Tables

| Scale<br>Score | Freq. | Pct.  | Cumulative |       |
|----------------|-------|-------|------------|-------|
|                |       |       | Freq.      | Pct.  |
| 361            | 828   | 0.70% | 113,472    | 96.5% |
| 364            | 835   | 0.71% | 114,307    | 97.2% |
| 369            | 790   | 0.67% | 115,097    | 97.8% |
| 374            | 684   | 0.58% | 115,781    | 98.4% |
| 381            | 653   | 0.56% | 116,434    | 99.0% |
| 391            | 571   | 0.49% | 117,005    | 99.5% |
| 399            | 436   | 0.37% | 117,441    | 99.8% |
| 407            | 202   | 0.17% | 117,643    | 100%  |